

A Systematic Review of the Effects of Non-invasive Care on the Body

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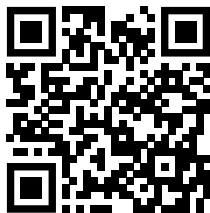
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Abstract

This study aimed to provide a more comprehensive understanding of non-invasive care by investigating, comparing, and describing the effects of non-invasive care on the human body, its needs, and the feelings of people receiving non-invasive care, and to explore how non-invasive care can synergize or influence modern contactless care. This narrative review included 44 articles selected from 22,222 articles referenced from PubMed, Google Scholar, Research Gate, and RISS databases using the PRISMA flowchart. Based on advanced cosmetic technology, non-invasive management was reconsidered and summarized for its effect on immunity and pain by directly focusing on non-invasive skin massage. This review demonstrates the utility of non-invasive management for cosmetic and therapeutic purposes since it provides the highest understanding of non-invasive management, specifically massage. We aimed to satisfy needs by carefully reconsidering and identifying consumers' desires to be beautiful and pain-free. We hope it will serve as a reference for those seeking pain relief and a beautiful appearance.

Keywords: Massage, Immune, Therapy, Alternative medicine, Non-invasive

Introduction

Here, we discuss application of massage therapy (MT) as a non-invasive treatment modality. Non-invasive treatment procedures, such as ultrasound or radiofrequency, do not involve cutting into the skin of the patient. Presently, with increasing social pressure to look youthful, interest in cosmetic procedures for skin and facial rejuvenation is increasing. Especially, interest in non-invasive/minimally invasive cosmetic treatments—that avoid surgery and superficial skin treatments (such as lasers, peels, or various injections)—is increasing. There is an increasing demand for MT. Medical conditions that benefit from MT include prenatal depression, preterm and term birth, autism, various skin conditions, pain syndromes (including arthritis and fibromyalgia), high blood pressure, asthma, multiple sclerosis,

immune conditions (including HIV), breast cancer, and geriatric diseases (including Parkinson's disease and dementia). In this review, we will systematically examine the effects of non-invasive MT on cosmetic procedures and health. One can see studies that have used the therapy and paid for it. We compare effect of different types of MT—1) with each other (e.g., Swedish vs. Thai massage), 2) with standard care procedures (as controls), and 3) with different active therapies, such as exercise (Field, 2016)—on improvements in general patient well-being and various ailments.

Methods

The narrative review approach was used. A total of 22,222

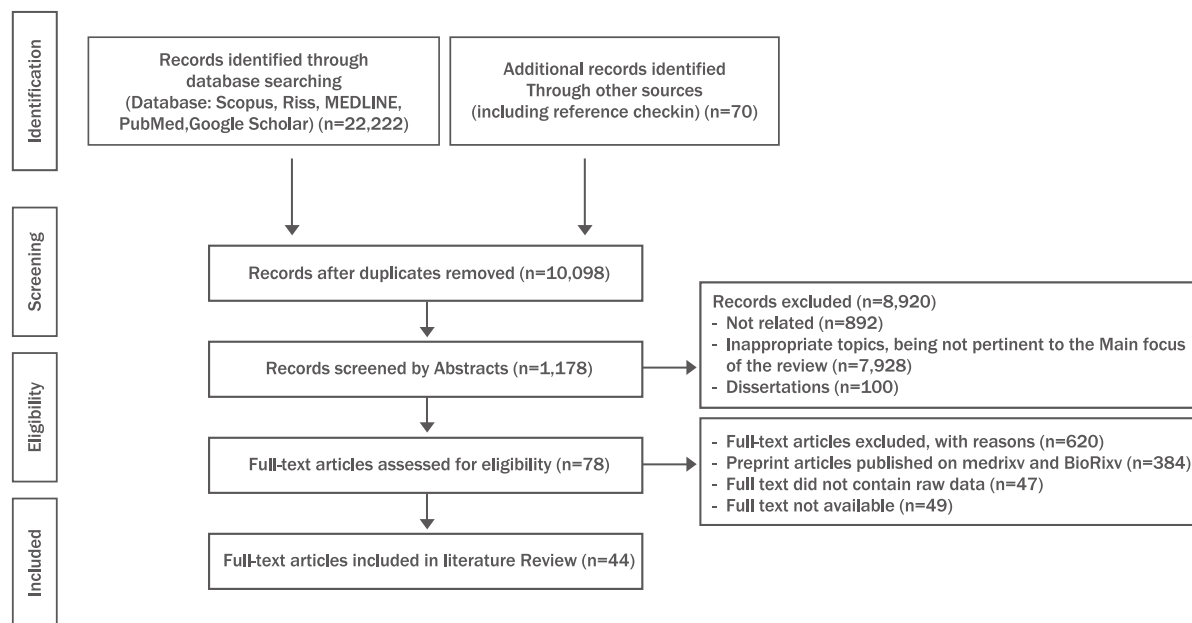


Figure 1. Literature review search results for systematic considerations of the effects of non-Invasive management on the body.

references were scoured using representative journal search websites such as PubMed, Google Scholar, ResearchGate, and RISS. Finally, 44 papers were included in this study (see PRISMA flow diagram, Figure 1).

Results

1. Effect of massage therapy on immunity

Moderate pressure massage positively affects weight gain in preterm infants, pain reduction in different syndromes including fibromyalgia and rheumatoid arthritis, attentiveness enhancement, depression reduction and immune function enhancement (increased natural killer cells and natural killer cell activity)(Field, 2014). Massage therapy has led to weight gain in

premature infants when moderate pressure massage was given. In a study of passive movement of the limbs, preterm infants gained significantly more weight and had increased bone density (Field *et al.*, 2010). High-quality preliminary evidence supports the possibility that massage exerts immunological effects (Tejero-Fernández *et al.*, 2015). There is preliminary evidence that massage may modulate immune parameters. Immunological recovery and post-exercise massage may be positively related (Major *et al.*, 2015). Massage may modulate immune parameters after exercise, facilitating the recovery of immunoglobulin and reducing the presence of pro-inflammatory mediators generated by high-intensity exercise. Recent clinical evidence suggests that the therapeutic effect of massage involves the immune system and that this can be exploited as an adjunct therapy together with standard drug-based approaches. Additionally, our results

Table 1. Non-invasive care effect of massage on immunity

Effect on immunity	Detail	References
Non-invasive treatment effects	Immune functionImproved immune function (increased natural killer cell activity and natural killer cell activity)	Field, 2014
	Weight changes in preterm infants	Field <i>et al.</i> , 2010
	Positive changes in CD4+ cell count and natural killer cell count	Hillier <i>et al.</i> , 2010
	Promotes the recovery of immunoglobulins	Tejero-Fernández <i>et al.</i> , 2015
	Restoring immunity	Major <i>et al.</i> , 2015
	Reduced inhibitory noradrenaline tone in lymphoid organs	Ernst, 1998

in mice support the hypothesis that massage-like therapies can treat immunodeficiencies and related disorders. MT improves quality of life for HIV/AIDS (PLWHA) patients, particularly when given in combination with other stress-management modalities; and MT positively affects immunological function. Positive changes in immune function are observed; CD4+ cell count and natural killer cell counts increased in response to MT (Hillier *et al.*, 2010). Thus, suggesting that massage-like therapies have immunomodulatory effects via reducing inhibitory noradrenergic tone in lymphoid organs (Ernst, 1998), (Table 1).

2. Role of massage in natural therapy

1) Massage relieves delayed onset muscle soreness (DOMS)

Post-exercise massage can relieve the DOMS. Many clinical findings confirm that MT is a promising treatment for DOMS (Field, 2002). Hippocrates (the father of modern medicine; 400 BC) described MT as the "medicine rubbing technique"; ancient medicine was essentially contact therapy. "Takeover" has been a major form of healing throughout history in places such as ancient Greece, where Hippocrates wrote that "a physician must be experienced in many things, especially friction." Tuina (Chinese traditional medicine) and Abhyanga (Indian Ayurveda) are tactile therapies of the East, which have for long implemented touch therapy. MT, reached West relatively late; western massage dates back to the 19th century Swedish physical educator, Per Henrik Ling. Well-researched effects of massage on flexibility and DOMS can inform coaches and athletes about its benefits and guide decisions about incorporating massage into training and competition (Ooi *et al.*, 2018). The efficacy of Thai massage in pain reduction is confirmed; compared to passive physical therapy, Thai massage reduces the average pain intensity more significantly. Thai massage effects on pain can last for several weeks (Keeratitanont *et al.*, 2015). Both Thai and Swedish

massage relieve chronic back pain by strengthening bodily functions, providing pain relief, improving disability and range of motion, improving psychological function, anxiety reduction, and mood improvement. Although based on different theoretical frameworks, they appear to be equally effective in relieving chronic back pain (Netchanok *et al.*, 2012).

2) Massage improves chronic constipation symptoms

Few countries (China, Japan, Russia and West Germany) recognize MT as a medical treatment. United States recognizes it as an alternative therapy. Although, methodologically flawed, clinical trials seem to suggest that abdominal massage is effective in treating chronic constipation (Ernst, 1998). In constipated patients, it can stimulate peristalsis, shorten colon transit time, increase the frequency of bowel movements, and reduce the discomfort and pain associated with it. Massage can stimulate peristalsis in patients with fecal impaction after surgery. Individual case reports indicate that abdominal massage is effective in relieving long-term functional constipation in patients diagnosed with various physiological abnormalities (Sinclair, 2011). Massage and cold-water immersion improved perceptions of recovery and reduced DOMS, especially in women. Mancinelli *et al* also reported a significant reduction in muscle soreness in female college basketball and volleyball players who received massage; around 80% of those who received massage reported a reduction in pain. Post-exercise massage may help relieve DOMS (Davis *et al.*, 2020), (Table 2).

3) Massage relieves chronic back pain

MT is very popular among Australians as a complementary and alternative therapy. As Australian health authorities increase their emphasis on evidence-based health care decision-making, massage therapists are required to move toward evidence-based

Table 2. Non-invasive care natural therapy through massage

Natural therapy	Detail	References
(1) Relieve DOMS symptoms	Relieve the symptoms of DOMS	Field, 2002
	Flexibility and DOMS help athletes train and compete	Ooi <i>et al.</i> , 2018
	Reduces pain intensity	Keeratitanont <i>et al.</i> , 2015
	Relieve chronic low back pain by strengthening body functions	Netchanok <i>et al.</i> , 2012
(2) Improve chronic constipation	Treating chronic constipation	Sinclair, 2011
	Reduce pain	Davis <i>et al.</i> , 2020
(3) Improve chronic low back pain	Effects on health conditions	Field <i>et al.</i> , 2005
	Effectiveness in reducing pain intensity in acute/subacute nonspecific low back pain	Furlan <i>et al.</i> , 2015

practices (EIPs). Because MT research has received considerable attention over the past 30 years, clinical evidences—that support the effectiveness of MT in many health conditions, including chronic back pain—exist. Compared to inactive treatment, massage was significantly better in pain intensity and disability management in patients with acute/subacute non-specific low back pain (Furlan *et al.*, 2015). Thus, growing research supports MT as an evidence-based treatment modality (Field *et al.*, 2005).

3. Effect of non-invasive massage care on physiological biochemistry

1) MT decreases cortisol levels

To investigate whether MT positively reduces cortisol levels, we reviewed literature on depression (including those on sexual abuse and eating disorders), pain syndromes, autoimmune conditions (including asthma and chronic fatigue), immunity (including HIV and breast cancer), work stress reduction, aging stress, and pregnancy stress. MT reduced cortisol levels in saliva and urine significantly (average reduction of 31%) (Field *et al.*, 2005).

2) Serotonin levels increase

MT increased urine serotonin and dopamine levels by an average of 28% and 31%, respectively. Taken together, MT has anti-stress (reducing cortisol) and mood elevating (increasing serotonin and dopamine) effects in a variety of medical conditions and stressful experiences (Calenda, 2006). MTs could exert their sympathetic effects through physiological and psychological mechanisms. MT may enhance hypothalamic-pituitary-adrenal cortical axis function and improve endothelial function by increasing blood flow (Edinoff *et al.*, 2020). Pressure applied during MT can stimulate visceral activity, reduce anxiety

and pain and increase serotonin levels (Stecco *et al.*, 2016).

3) Dopamine levels increase

MT appear to be safe and effective in treating cancer pain. Cancer patients who received the massage reported reduced pain, nausea, and anxiety during the procedure and an improved quality of life. Massage is increasingly used in cancer treatment centers and hospitals. Massage positively affects biochemistry: it increases dopamine levels, lymphocytes and natural killer cells numbers (Nelson, 2015). When treating fascia-related ailments, anatomy and characteristics of fascial tissue must be considered to identify appropriate massage type (Goats, 1994). Ailments involving superficial fascia—which includes changes in mechanical coordination, proprioception, balance, myofascial pain—are characterized by lymphatic, facial vascular, and thermoregulatory dysfunctions. Superficial fascia contains more surface and elastic tissue than other types. Therefore, expectedly, light massage or massage using a large surface to apply diffuse friction in the parasympathetic first layer, are more effective in treating ailments involving superficial fascia. Spasticity involves deep fascia and posterior membrane and therefore requires deep massage (that reaches the muscle surface). Therefore, use of small surface tool and manual deep rub with the knuckle or elbow is recommended for treating deep fascia and/or posterior membrane ailments. Benefit of using appropriate massage type is supported by the results of previous local anesthesia experiments that showed that arterial dilatation was primarily controlled by local axonal reflexes. Excessive massage in healthy adults increases both local blood flow and heart rate. Further, this excessive massage effect lasts longer than that of gentle pressure massage; thus, it is a powerful tool to accelerate healing. While local vascular reactions are primarily

Table 3. Non-invasive care effect of massage on biochemistry

Impact on biochemistry	Detail	References
(1) Decreased Cortisol levels	Stress relief (cortisol reduction)	Field <i>et al.</i> , 2005
(2) Serotonin levels increase	Stress (decreased cortisol) and activation effects (increased serotonin and dopamine)	Calenda, 2006
	Improves hypothalamic-pharyngeal-adrenal cortex axis function and increases blood flow	Edinoff <i>et al.</i> , 2020
(3) Dopamine levels increase	Reduce anxiety and pain	Stecco <i>et al.</i> , 2016
	Increases levels of dopamine, lymphocytes, and natural killer cells	Nelson, 2015
	Lymphatic, facial vascular, and thermoregulatory functions	Goats, 1994
	Treatments for anxiety and pain	Noto <i>et al.</i> , 2010

due to histamine release, increased stroke volume reflects improved venous return. MT promotes psychosocial relaxation, can reduce stress, and improves immune function. MT is currently used in palliative care to relieve anxiety and pain. Psychosocial status is generally evaluated through subjective psychological tests, conducted using questionnaires such as STAI (State-Trait Anxiety Inventory); these assessments are limited by lack of reliability in self-reporting. Salivary gland biomarkers are useful objective indicators to evaluate psychosocial status. MT modulates biomarkers in saliva which indicate psychosocial relaxation, reduced stress, and improved immune function status. As such, MT is currently used in palliative care for anxiety and pain relief (Noto *et al.*, 2010) (Table 3).

4. Effect of non-invasive massage care on body and mind

1) Effects of massage on the general body physiology

MT shows beneficial results in various ailments. It improves nasal breathing in children, reduces back pain in nurses, and improves adrenal cortical function in infants. Swedish massage has beneficial effects in several populations and can be used therapeutically. It is recommended for use in disease prevention (Angelopoulou *et al.*, 2020). MT induces relaxation. Various therapeutic massage types (such as classic full-body therapeutic massage and reflexology), improve quality of life. MT—such as classic deep therapy massage, traditional Japanese massage, Thai massage, neuromuscular therapy, and intuit—improves non-motor symptoms such as sleep disorders, pain, fatigue, anxiety, and depressive symptoms. They also improve motor symptoms (Michalsen & Bühring, 1993). Connective tissue massage involves the skin and subcutaneous tissue. It focuses on specific body areas that are classified into segments comprising of closely-associated internal organ and locomotor systems (such as spinal cord, joints, muscles). Connective tissue massage is derives name from the concept that the physiology of a given connective tissue and the organ it is partially connected to, are mutually associated. Sympathetic reflex dystrophy may explain such localized pathophysiology. Connective tissue massage is considered an important component of physical therapy (Moraska *et al.*, 2010). The use of MT by common people has increased significantly in recent years. Given the popularity of MT for stress reduction, a comprehensive review of established literature is important to summarize the effects of MT on physiological indicators of stress-response. Although MT significantly alleviates stress symptoms, due to lack of

scientific rigor a definitive understanding of the effects of MT—on various physiological variables associated with stress—is missing (Posadzki & Parekh-Bhurke, 2011). Among existing literature, most data, on the effect of massage on physiological stress indicators, were collected twice weekly for five weeks, and trained therapists assessed the physiological indicators of stress, after single- or multiple-session MT. Although, effect of single MT session on stress indicators were repeatable within a study, a sustained effect was not seen across studies. To date, experimental results on multi-session MT effect on urine cortisol and catecholamines levels are inconclusive. However, it is definitively known that multi-session MT positively affects diastolic blood pressure.

MT increases blood circulation and lymphatic fluid, lowers stress on muscles, helps to remove waste products, and releases endorphins to release tension. Among the different types of massage, abdominal massage can stimulate the gastrointestinal response by stimulating parasympathetic nerve activity. Through mechanical and reflexive methods, it increases peristalsis and changes the pressure in the abdomen, which in turn accelerates the passage of food through the gastrointestinal tract. In patients with nasogastric tubes, abdominal massage reduces muscle tension, improves local circulation, alleviates malnutrition, stimulates gastric acid secretion, increases appetite and intestinal motility, reduces gastric residual volume, reduces abdominal distension, fecal incontinence, intra-abdominal pressure, and constipation. Abdominal massage effectively reduces residual volume and swelling in patients receiving mechanical ventilation in a surgical intensive care unit. Abdominal massage also reduces distension, urinary incontinence, bowel movement frequency, and laxative consumption in spinal cord injury patients. Moreover, in chronically constipated disabled children and elderly people in nursing homes, it increases appetite, bowel movement frequency, stool weight and consistency, and complete defaecation (Dehghan *et al.*, 2020). MT comprising moderate pressure massage, led to weight gain in premature infants. Passive limb movement in preterm infants caused them to gain significantly more weight and increased their bone densities. Several putative mechanisms (such as increases in vagal activity, gastric motility, or IGF-1 and insulin levels) underlying the MT effects on weight gain in preterm infants were analyzed. It was found that increased caloric intake and physical activity were not involved in weight gain. However, greater weight gain was associated with increased gastric motility which was caused by

increased vagal activity. Additionally, greater weight gain was associated with increased IGF-1 levels. However, IGF-1 level was not associated with increased vagal activity, suggesting that increased IGF-1 represents an independent pathway for MT mediated weight gain in preterm infants (Field *et al.*, 2011). MT is increasingly being used to relieve symptoms in cancer patients. MT significantly reduces cancer pain compared to treatments not involving massage. Massage is effective in relieving cancer pain, especially surgery-related pain (Lee *et al.*, 2015). MT reduces chemotherapy-induced nausea and vomiting (Mazlum *et al.*, 2013).

2) The effect of massage on the mental health

This article tries to highlight literature that could help integrate the fields of psychotherapy and massage, given the nature of their individual beneficial effects. In this multifaceted review, we seek to help patients by combining principles of anatomy, physiology, and neuroscience with psychotherapy and MT. Psychotherapists with interdisciplinary knowledge are more likely to provide holistic treatment to depressed patients. A descriptive review and a qualitative and conceptual synthesis of the literature were conducted to create a novel theoretical-pragmatic framework, to introduce accepting MT as part of psychotherapy practice; potentially integrating psychotherapeutic knowledge on managing depressive symptoms with clinical decision-making (Viggo Hansen *et al.*, 2006). Massage and touch are the basis of other therapies offered to reduce or manage various conditions associated with dementia, such as anxiety, agitation, and depression. As a non-pharmacological alternative, massage and touch can offset cognitive decline (Heidari *et al.*, 2022). Various approaches involving massage are effective on patients; and symptoms such as fatigue, pain, anxiety, depression, and convulsions are improved through MT. The results of this review indicate that massage may have beneficial effects on motor and non-motor symptoms, and massage can be considered as a complementary and alternative treatment combined with conventional medicine for patients with multiple sclerosis. Pain and fatigue are best improved by Swedish massage, while anxiety and depression are effectively improved by reflexology. MT can improve behavioral conduct disorders (aggression, anxiety, agitation, resistance to care) in the elderly, and therapeutic massage can be a complementary treatment in rehabilitation programs to improve behavior disorders (Pang

et al., 2021). Obesity affects health, and effective preventive measures are needed to reduce the occurrence of obesity-related diseases in childhood. The etiology of simple obesity is spleen deficiency, which can be alleviated with a specific massage. Oriental acupuncture and massage are based on meridian theory; and MT aims to obtain similar therapeutic effects to acupuncture by stimulating specific meridians. Massage is widely applied clinically because it is economical, convenient, and safe. During massage treatment, the therapist touches the skin with their hands, presses, rubs, kneads, grabs, pinches, etc. to penetrate the body with pressure to achieve the therapeutic purpose. Appropriate pressure is required for MT to be effective, and a review of studies comparing medium and light pressure massage suggests that improved growth and development in infants and reduced stress in adults, in response to MT, is observed only with medium pressure massage. Various benefits associated with MT are mediated through increased vagal activity caused by baroreceptors stimulation. MT is becoming increasingly popular in the field of physical therapy and rehabilitation of humans and animals. The widespread application of MT has led to research efforts aimed at providing scientific evidence for its anecdotal beneficial effects, particularly pain relief. MT alters dopamine and serotonin levels, reduces noradrenaline levels, and modulates the immune system. Psychological effects such as reduction of stress and anxiety, along with improvement in depressed patients, are reported in humans (Formenton *et al.*, 2017). Connective tissue massage improves depression and quality of life. Acupressure improves pain, pain pressure threshold, fatigue, sleep, and quality of life. Overall, most MT types have consistently improved quality of life for patients with fibromyalgia (Yuan *et al.*, 2015).

MT is the scientific manipulation of the body's soft tissues to normalize the tissue, and consists of manual techniques that apply fixed or movable pressure and hold and/or move the body. There are over 1500 massage training centers or schools in the United States. Several studies have evaluated the effectiveness of massage for improving children's health and treating various disorders. Pupillary massage increases blood circulation in the body, improves breathing, stimulates growth, and increase concentration and IQ. MT improves the immune system, reduces stress, pain, anger, aggression, and the ability to sleep well (Emtiaz & Abrishamkar, 2016). MT reduces subjectively perceived symptoms of pain in cancer patients receiving palliative

care. MT provides relief to palliative care patients in hospices. Thus, MT should be considered as a cost effective and non-invasive intervention that has a positive impact and contributes to the reduction of pain, anxiety and depression in patients with severe cancer (Falkensteiner *et al.*, 2011). Among effects of massage on relaxation, comfort, and sleep, the most consistent effect of massage was anxiety reduction. Massage significantly reduced perceptions of anxiety or tension. We also found that massage induced physiological relaxation manifests as significant changes (in the expected direction) of one or more physiological stress indicators. Moreover, when examining the effect of massage on discomfort, it was found to be effective in reducing pain (Richards *et al.*, 2000). Massage is an effective method of treatment. The main goal of treatment is to reduce pain. Significant improvements in health may be seen with MT. It is easy to administer in daily medical practice (Miernik *et al.*, 2012) (Table 4).

Discussions

The purpose of this review was to systematically examine the

effects of massage as a non-invasive disease management and treatment modality. According to the International Society of Aesthetic Plastic Surgery, procedures that do not involve skin incision, such as ultrasound or radiofrequency, are classified as non-invasive. Therefore, massage is classified as non-invasive disease management modality (Lee *et al.*, 2017).

The word massage is derived from the Greek word "masso" which means to knead with hand (which also means manipulation in Hebrew) (Bownell, 1989). Skin beauty meridian massage normalizes the external expression by improving skin lesions through acupressure or massage; it does not employ acupuncture or moxibustion on the meridians and acupoints. In addition, as a massage technique employing physical energy, it facilitates communication between qi and blood so that body fluids flow normally. It enhances the natural healing power, helps the meridians, and diagnoses and improves the defects of the ledger (Kim, 2005). The purpose of this review was to systematically review the effectiveness of massage as a non-invasive management and treatment. Effects of massage can be summarized as follows: Massage rids body of toxic substances to reduce fatigue. Massage improves blood circulation by stimulating blood vessels in the skin via physical stimulation

Table 4. Non-invasive care effect of massage on body and mind

Impact on biochemistry	Detail	References
(1) Effects of massage on the body	Recommended for use in disease prevention	Angelopoulou <i>et al.</i> , 2020
	Improve exercise symptoms	Michalsen & Bühring M, 1993
	Important components of physical therapy	Moraska <i>et al.</i> , 2010
	Positive for diastolic blood pressure	Posadzki & Parekh- Bhurke, 2011
	Effective in reducing residual volume and swelling in mechanically ventilated patients in surgical intensive care units	Dehghan <i>et al.</i> , 2020
	Weight gain in preterm infants	Field <i>et al.</i> , 2011
	Reduced cancer pain	Lee <i>et al.</i> , 2015
(2) Effect of massage on the mind	Reduced nausea and vomiting	Mazlum, 2013
	Improve holistic care for patients with depression	Viggo Hansen <i>et al.</i> , 2006
	Offsetting cognitive decline	Heidari <i>et al.</i> , 2022
	Complementary therapies in rehabilitation programs for behavioral disorders	Pang <i>et al.</i> , 2021
	Relieve with a specific massage approach	Field <i>et al.</i> , 2010
	Psychological effects such as reduced stress and anxiety, and improvement in patients with depression	Formenton <i>et al.</i> , 2017
	Improve your ability to sleep well	Emtiazy & Abrishamkar, 2016
	Reduced pain, anxiety, and depression in patients with severe cancer	Falkensteiner <i>et al.</i> , 2011
	Reduced anxiety, pain	Richards <i>et al.</i> , 2000
	The goal is to reduce pain	Miernik <i>et al.</i> , 2012
	Improving the quality of life for people with fibromyalgia	Yuan <i>et al.</i> , 2015

(such as stroking, kneading, rubbing, tapping, shaking, etc., depending on the type). Simultaneously, it improves blood circulation and relieves disease burden. It has psychological, reflexive, and mechanical relaxation effects, such as relieving anxiety, improving sleep, dilating blood vessels, promoting circulation, stimulating or soothing the central nervous system, relaxing muscles, reducing tension and relieving muscle spasms, reducing pain, and increasing body flexibility. Massage reduces absorption of toxic substances, increases urination, and peristalsis. In addition, it helps remove aging cells by improving blood and lymph circulations, promotes joint mobility, removes subcutaneous fat, strengthens skin elasticity, strengthens body tissues, normalizes nutrition, lowers blood pressure, relieves headaches, promotes physical happiness and recovery from injuries, and promotes relief from tension, depression, anger, and fatigue. MT can be a complementary treatment in the rehabilitation program for improving behavior disorders (Barquilla Ávila & Rodríguez-Mansilla, 2015). Swedish massage involves systematic application of manual pressure and soft tissue movements along with rhythmic pressure and stroking to gain and maintain health, confirming the results of previous studies evaluating the benefits of Swedish massage in promoting health and preventing disease. Swedish massage is beneficial in various populations studied, and can be used for disease prevention and treatment (Barreto & Batista, 2017).

As an alternative medical practice, massage has shown relevant beneficial results in most cases, including improved nasal breathing in children, reduced back pain in nurses, and improved adrenal cortical function in infants. However, massage is not completely risk-free and should be performed very carefully by trained professionals. Human body derives several benefits, such as increased blood flow, reduced muscle tension, reduced nerve excitability, and increased feelings of well-being, from massage. The mechanical pressure applied during massage, increases muscle flexibility and thereby, improves range of joint motion, reduces passive and active stiffness (forms of biomechanical stiffness). Mechanical pressure, via friction, can help increase blood flow by increasing arteriolar pressure and muscle temperature. Depending on the massage technique used, mechanical pressure applied to the muscles is likely to affect the nerve excitability which are measured using the neurological Hoffmann reflex test (which reflects corticospinal tract functioning). Massage results in physiological relaxation by inducing changes in parasympathetic nerve activity (measured as

changes in heart rate, blood pressure, and heart rate variability) and hormone levels (measured as changes in cortisol levels). Further, massage causes psychological relaxation by reducing anxiety and elevating mood. Together, these physiological and psychological changes caused by massage, can benefit athletes by improving performance and reducing risk of injury (Weerapong *et al.*, 2005).

Conclusion

This review was born out of our understanding of non-invasive management modalities, especially MT, and our conviction that it is useful in cosmetic care and disease treatment. To gain new understanding of their needs, we reviewed the existing MT literature from the perspective of the people who use massage for health or cosmetic purposes. We hope, that this review, will serve as a reference for pain management researchers and medical estheticians.

Author's contribution

TOK designed, collected literatures and wrote the overall papers. KHK did advisory. All authors read and approved the final manuscript.

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References

- Angelopoulou E, Anagnostouli M, Chrousos GP, Bougea A. Massage therapy as a complementary treatment for Parkinson's disease: a systematic literature review. *Complementary Therapies in Medicine*, 49: 102340, 2020.
- Barquilla Ávila C, Rodríguez-Mansilla J. Masoterapia en las alteraciones conductuales de ancianos con demencia. Therapeutic massage on behavioral disturbances of

- elderly patients with dementia. *Atención Primaria*, 47: 626-35, 2015.
- Barreto DM, Batista MVA. Swedish massage: a systematic review of its physical and psychological benefits. *Advance in Mind-Body Medicine*, 31: 16-20, 2017.
- Calenda E. Massage therapy for cancer pain. *Current Pain and Headache Reports*, 10: 270-4, 2006.
- Davis HL, Alabed S, Chico TJA. Effect of sports massage on performance and recovery: a systematic review and meta-analysis. *BMJ Open Sport & Exercise Medicine*, 7: e000614, 2020
- Dehghan M, Malakoutikhah A, Ghaedi Heidari F, Zakeri MA. The effect of abdominal massage on gastrointestinal functions: a systematic review. *Complementary Therapies Medicine*, 54: 102553, 2020.
- Edinoff A, Sathivadivel N, McBride T, Parker A, Okeagu C, Kaye AD, Kaye AM, Kaye JS, Kaye RJ, M Sheth M, Viswanath O, Urits I. Chronic pain treatment strategies in Parkinson's disease. *Neurology International*, 12: 61-76, 2020.
- Emtiazy M, Abrishamkar M. The effect of massage therapy on children's learning process: a review. *Iran Journal of Medicinal Sciences*, 41: S64, 2016.
- Ernst E. Does post-exercise massage treatment reduce delayed onset muscle soreness? a systematic review. *British Journal of Sports Medicine*, 32: 212-214, 1998.
- Falkensteiner M, Mantovan F, Müller I, Them C. The use of massage therapy for reducing pain, anxiety, and depression in oncological palliative care patients: a narrative review of the literature. *ISRN Nursing*, 2011: 929868, 2011.
- Field T, Diego M, Hernandez-Reif M. Moderate pressure is essential for massage therapy effects. *International Journal of Neuroscience*, 120: 381-5, 2010.
- Field T, Diego M, Hernandez-Reif M. Potential underlying mechanisms for greater weight gain in massaged preterm infants. *Infant Behavior Development*, 34: 383-389, 2011.
- Field T. Massage therapy. *Medical Clinics North America*, 86: 163-71, 2022.
- Field T, Hernandez-Reif M, Diego M, Schanberg S, Kuhn C. Cortisol decreases and serotonin and dopamine increase following massage therapy. *International Journal of Neuroscience*, 115: 1397-413, 2005.
- Field T. Massage therapy research review. *Complementary Therapies in Clinical Practice*, 20: 224-9, 2014.
- Field T. Massage therapy research review. *Complementary Therapies in Clinical Practice*, 24: 19-31, 2016.
- Formenton MR, Pereira MAA, Fantoni DT. Small animal massage therapy: a brief review and relevant observations. *Topics in Companion Animal Medicine*, 32: 139-145, 2017.
- Furlan AD, Giraldo M, Baskwill A, Irvin E, Imamura M. Massage for low-back pain. *The Cochrane database of systematic reviews*, 2015: CD001929, 2015.
- Goats GC. Massage—the scientific basis of an ancient art: Part 1. The techniques. *British Journal of Sports Medicine*, 28: 149-52, 1994.
- Heidari Z, Shahrbanian S, Chiu C. Massage therapy as a complementary and alternative approach for people with multiple sclerosis: a systematic review. *Disability and Rehabilitation*, 44: 5758-5769, 2022.
- Hillier SL, Louw Q, Morris L, Uwimana J, Statham S. Massage therapy for people with HIV/AIDS. *Cochrane Database Systematic Reviews*, 2010: CD007502, 2010.
- Keeratitanont K, Jensen MP, Chatchawan U, Auvichayapat P. The efficacy of traditional Thai massage for the treatment of chronic pain: a systematic review. *Complementary Therapies in Clinical Practice*, 21: 26-32, 2015.
- Kim SH. A study on skin beauty meridian and obese body type management behavior in women. *Journal of the Korean Academy of Beauty*, 11: 34-43, 2005.
- Lee JY, Jeong YJ, Ri SH. A study on the effect of gold therapy and stone therapy on changes in body size in the neck, back, and shoulder areas. *Digital Convergence Research*, 15: 465-476, 2017.
- Lee SH, Kim JY, Yeo S, Kim SH, Lim S. Meta-analysis of massage therapy on cancer pain. *Integrative Cancer Therapies*, 14: 297-304, 2015.
- Major B, Rattazzi L, Brod S, Pilipović I, Leposavić G, D'Acquisto F. Massage-like stroking boosts the immune system in mice. *Scientific Reports*, 5: 10913, 2015.
- Mazlum S, Chaharsoughi NT, Banihashem A, Vashani HB. The effect of massage therapy on chemotherapy-induced nausea and vomiting in pediatric cancer. *Iran Journal of Nursing and Midwifery Research*, 18: 280-284, 2013.
- Michalsen A, Bühring M. Bindegewebsmassage [Connective tissue massage]. *Wiener Klinische Wochenschrift*, 105: 220-227, 1993.

- Miernik M, Wieckiewicz M, Paradowska A, Wieckiewicz W. Massage therapy in myofascial TMD pain management. *Advances in Clinical and Experimental Medicine*, 21: 681-685, 2012.
- Moraska A, Pollini RA, Boulanger K, Brooks MZ, Teitlebaum L. Physiological adjustments to stress measures following massage therapy: a review of the literature. *Evidence-Based Complementary and Alternative Medicine*, 7: 409-18, 2010.
- Nelson NL. Massage therapy: understanding the mechanisms of action on blood pressure. a scoping review. *Journal of the American Society of Hypertension*, 9: 785-793, 2015.
- Netchanok S, Wendy M, Marie C, Siobhan O. The effectiveness of Swedish massage and traditional Thai massage in treating chronic low back pain: a review of the literature. *Complementary Therapies in Clinical Practice*, 18: 227-34, 2012.
- Noto Y, Kudo M, Hirota K. Back massage therapy promotes psychological relaxation and an increase in salivary chromogranin A release. *Journal of Anesthesia*, 24: 955-8, 2010.
- Ooi SL, Smith L, Pak SC. Evidence-informed massage therapy - an Australian practitioner perspective. *Complementary Therapies in Clinical Practice*, 31: 325-331, 2018.
- Pang Y, Wang K, Chen S, Huang T, Zhang M, Zhang B, Yu J. Massage for simple obesity: a protocol for systematic review. *Medicine (Baltimore)*, 100: e24336, 2021.
- Posadzki P, Parekh-Bhurke S. Incorporation of massage into psychotherapy: an integrative and conjoint approach. *Chinese Journal of Integrative Medicine*, 17: 154-8, 2011.
- Richards KC, Gibson R, Overton-McCoy AL. Effects of massage in acute and critical care. *AACN Clinical Issues*, 11: 77-96, 2000.
- Sinclair M. The use of abdominal massage to treat chronic constipation. *Journal of Bodywork and Movement Therapies*, 15: 436-45, 2011.
- Stecco A, Stern R, Fantoni I, De Caro R, Stecco C. Fascial disorders: implications for treatment. *PM & R: the Journal of Injury, Function, and Rehabilitation*, 8: 161-8, 2016.
- Tejero-Fernández V, Membrilla-Mesa M, Galiano-Castillo N, Arroyo-Morales M. Immunological effects of massage after exercise: a systematic review. *Physical Therapy in Sport*, 16: 187-92, 2015.
- Viggo Hansen N, Jørgensen T, Ørtenblad L. Massage and touch for dementia. *Cochrane Database of Systematic Reviews*, 2006: CD004989, 2006.
- Weerapong P, Hume PA, Kolt GS. The mechanisms of massage and effects on performance, muscle recovery and injury prevention. *Sports Medicine*, 35: 235-56, 2005.
- Yuan SL, Matsutani LA, Marques AP. Effectiveness of different styles of massage therapy in fibromyalgia: a systematic review and meta-analysis. *Manual Therapy*, 20: 257-64, 2015.

국문초록

비침습적 치료가 신체에 미치는 영향에 대한 체계적인 검토

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본 연구는 비침습적 치료가 인체에 미치는 영향, 필요성, 비침습적 치료를 받는 사람들의 감정을 조사하여 비교, 설명함으로써 비침습적 치료에 대한 보다 포괄적인 이해를 제공하고, 비침습적 치료가 현대의 비접촉식 치료에 어떻게 시너지 효과를 발휘하거나 영향을 미칠 수 있는지 탐구하는 것을 목표로 한다. 본 총설 논문은 PRISMA 흐름도를 사용하여 PubMed, Google Scholar, Research Gate 및 RISS 데이터베이스에서 참조된 22,222개의 논문 중 44개의 논문을 선별 사용하였다. 첨단 미용 기술을 바탕으로 비침습적 피부 마사지에 직접적으로 초점을 맞추어 면역력과 통증에 미치는 영향에 대해 비침습적 관리를 재고하고 요약하였다. 또한 비침습적 관리, 특히 마사지에 대한 가장 높은 이해를 제공함으로써 미용 및 치료 목적의 비침습적 관리의 유용성을 입증하여 아름답고 고통 없이 되고자 하는 소비자의 욕구를 신중하게 재고 및 파악하여 그 욕구를 충족시키고자 한다. 본 총설을 통하여 통증 완화와 아름다운 외모를 원하는 분들에게 참고가 되길 바란다.

핵심어: 마사지, 면역, 치료, 대체 의학, 비침습적

참고문헌

김선희. 여성의 피부미용경락 및 비만 체형 관리행태 연구. *한국미용학회지*, 11: 34-43, 2005.

이진영, 정연정, 리순화. 골드테라피와 스톤테라피가 목, 등, 어깨 부위 신체 치수 변화에 미치는 영향 연구. *디지털융복합연구*, 15: 465-476, 2017.

中文摘要

非侵入性护理对身体影响的系统评价

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本研究旨在通过调查、比较和描述非侵入性护理对人体的影响、需求和接受非侵入性护理的人的感受, 提供对非侵入性护理更全面的理解, 并探讨非侵入性护理如何协同或影响现代非接触式护理。这篇叙述性评论包括使用 PRISMA流程图从PubMed、Google Scholar、Research Gate和RISS数据库引用的22,222篇文章中选出了44篇文章。基于先进的美容技术, 通过直接关注非侵入性皮肤按摩, 重新考虑和总结非侵入性管理对免疫力和疼痛的影响。这篇综述证明了非侵入性管理在美容和治疗方面的实用性, 因为它提供了对非侵入性管理, 特别是按摩的最高理解。我们旨在通过仔细重新考虑和确定消费者对美丽和无痛的渴望来满足需求。我们希望它能为那些寻求减轻疼痛和美丽外表的人提供参考。

关键词: 按摩, 免疫学, 疗法, 替代医学, 非侵入性