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The role of gentle touch in perinatal osteopathic manual therapy

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ABSTRACT

Osteopathic medicine is a system of manual diagnosis and treatment. While there is growing evidence that osteopathy is effective in a range of clinical conditions, the underlying biological basis of its therapeutic effects remain largely unknown. Given that the sense of touch plays a critical role in osteopathy, in this perspective article, with a particular focus on perinatal care, we explore the potential mechanisms by which stimulation of the skin senses can exert beneficial physiological and psychological effects, aiding growth and development. We propose that a class of low threshold mechanosensitive c-fibre, named c-tactile afferents, which respond optimally to gentle, slow moving touch are likely to play a direct and significant role in the efficacy of manual therapies. A greater understanding of the impact the type and quality of touch plays in therapeutic tactile interventions and in particular the neuroscience underpinning these effects will aid the development of more targeted, population specific interventions.

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1. Introduction

Healthcare services are coming under increasing pressure to demonstrate that all therapeutic procedures and interventions are predicated on evidence-based practice (EBP), with for example the British Medical Association (BMA) stating that some Complementary and Alternative (CAM) treatments should no longer be funded or commissioned by the National Health Service (NHS) in the UK. This may well be the tip of an iceberg when it comes to evaluating less contentious, but non-mainstream, therapies in healthcare and one that, according to Kasiri-Martino and Bright (2016), is 'creating a climate of criticality' amongst many healthcare professionals.

Osteopathic medicine (or osteopathy), which is still regarded by some as CAM, is a system of manual diagnosis and treatment for a range of musculoskeletal and non-musculoskeletal clinical conditions. Osteopaths utilise a wide range of therapeutic techniques to promote adaptation and support homeostasis that has been altered

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by impaired function of skeletal, arthrodial, and myofascial components of the body framework and their related vascular, lymphatic, and neural elements (WHO, 2010). There is growing evidence that osteopathic manipulative treatment (OMT) is effective in the management of musculoskeletal conditions such as low back pain (e.g., Licciardone et al., 2013a), chronic migraine (Cerritelli et al., 2015a) and in specific clinical populations such as paediatrics (Cerritelli et al., 2015b). Notwithstanding the therapeutic effects of OMT, its underpinning biological mechanisms are largely unknown. It is therefore understandable why a number of science and mainstream medical writers have recently questioned the plausibility and clinical effectiveness of osteopathic care, particularly in the field of paediatrics.

As part of an initiative to address the growing pressure for osteopathy to demonstrate adherence to EBP (Thomson et al., 2011), Kasiri-Martino & Bright (2016) have found that within the profession (albeit from a qualitative study with a small sample size of n = 9) there is a clear polarization regarding adherence to Osteopathic Principles (OP) (Ward, 1997), which have themselves undergone many metamorphoses since being first laid down by the founder, A.T.Still (Stark, 2013). One cohort in this study believed that the 'philosophy' of OP was fundamental in driving patient care and that it was even superior to the science, with another cohort believing that relying on a limited evidence-base was restricting progress in the osteopathic profession and that an EBP approach was required in order to maintain credibility within the healthcare profession. It was further found that a reliance on anecdote was unacceptable for a system of osteopathic principles that should guide best professional practice. Lewis (2012) has recently highlighted the current ambiguity in OP, suggesting that on the one hand A.T.Still expected a rigorous scientific approach from students, while on the other promoting intuition and clairvoyance as key guiding factors. According to Fryer (2008) and Thomson et al. (2014a,b), a better understanding of the translation of OPs to osteopathic practice by applying evidence-based medicine principles would encourage best practice in osteopathy.

It is axiomatic that the sense of touch plays a central role in osteopathic diagnosis, treatment, and in the development of therapeutic relationships with patients. However, little is known regarding the impact that touch is having on the patient's nervous system during osteopathic procedures for example on pain modulation, autonomic nervous system (ANS) function and emotional processing. The sense of touch plays a fundamental role in nurture and attachment during development (Walker and McGlone 2013 for review), and in many social and dyadic interactions in adulthood, with well documented positive impacts on health and well-being (House et al., 1988; Berscheid, 2003).

In this perspective paper we aim to explore and explain, in the light of recent advances in our knowledge of the sensory innervation of the skin, the effects of touch in a broader sense, where 'touch' will be viewed as a sub-modality of the "somatosensory system", a term which covers the wide array of specialized receptors, peripheral nerves, and central processing stages underlying the transduction and processing of somatosensory signals. Collectively, these sub modalities are engaged in sensing, perceiving, and acting upon stimulation of the body surface, or during muscle activity. Cutaneous sensations are essentially multimodal and include the senses of touch, temperature, itch and pain. Here we explore how, and why, stimulation of the skin senses, particularly during perinatal therapeutic procedures common to the field of osteopathy, has quantifiable beneficial effects on both the physiology and psychology of the infant. We hypothesize the clinical impact of OMT is in large part due to a recently identified and characterized system of gentle-touch responsive nerves, found only in the hairy skin of the body.

2. The importance of touch to development

Touch is a critical communication channel during nurturing behaviour, a topic first addressed in the classical work of Harlow and Zimmermann (1958) and Harlow and Harlow (1962a) who found that the absence of comforting touch led to long lasting psychological stress in monkeys. The neonatal period is a time of significant neurodevelopment, and hence a period when the degree and type of social interaction is likely to have a disproportionate influence on the development and expression of social behaviour in adulthood (Meredith, 2015; Porges and Furman, 2011). The stress-reducing effects of touch have been confirmed in rodent studies where licking and grooming of rat pups by their mothers was found to permanently change how the rat, as an adult, responded to stressful events (Champagne and Meaney, 2007; Menard et al., 2004). This demonstration that levels of affiliative and nurturing touch, between the mother and offspring, can affect behaviours in adult life is further supported by Hellstrom et al. (2012) who found that the adult offspring of mothers that displayed high levels of pup licking-grooming, as the result of epigenetic programming, showed increased levels of glucocorticoid receptor expression and lower physiological responses to stress. This type of licking-grooming behaviour targets specific body sites on the pup, in particular, around the dorsal back and head/ears. These studies show clearly that tactile nurturing interactions during the neonatal period impact the subsequent expression of adult behaviour by altering sensitivity to neuropeptides (e.g., oxytocin and arginine vasopressin), thereby influencing the expression of behaviours such as affiliation, aggression, socio-sexual behaviour, parental behaviour, and responses to stress (Cushing and Kramer, 2005). Close physical proximity between newborn infants and caregivers results in improved growth and development as measured by a wide range of physiological, behavioral and neuropsychological indices (Harlow and Harlow, 1962b; Spitz, 1945; Kuhn and Schanberg 1998). Conversely, by assaying a growth enzyme biomarker that is a sensitive index of tissue growth, Schanberg and Field (1987) found that low weight gain correlated with a lack of maternal touch, independent of whether the mother was lactating. This biomarker was reduced in pups that failed to thrive, but at normal levels in those that were in physical contact with their mother. Interestingly, the authors found that levels of the biomarker dropped within just a few hours of separation, returning to normal when the pups and dams were reunited. Several authors (Kuhn et al., 1990; Suchecki et al., 1993; van Oers et al., 1998) have shown that even in the absence of maternal licking and grooming input, these effects are mimicked by stroking with a soft brush—highlighting the critical importance of tactile stimulation (see also Walker and McGlone, 2013 for a review). Further evidence for how early life experiences can impact on brain development can be found in a study from Baldini et al. (2013) who demonstrated that insulin like growth factor-1 (IGF-1) is a key mediator of the efficacy of massage type stroking in counteracting the negative effects of maternal separation. Their findings suggest that the mechanism of action is probably the same as that found with licking and grooming i.e., it leads to a significant increase in glucocorticoid receptor expression in the hippocampus. These effects occurred in various body organs where tissue differentiation was taking place, including the brain, suggesting that maternal contact contributes to brain growth as well as weight gain.

Looking at human mother-infant behavior, Stack and Muir (1990) found that touch occurred ~65% of the time during face-to-face interactions which, claim the authors, acts to reduce stress and