Journal of Bodywork & Movement Therapies (2015) 19, 380–388

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/jbmt

PREVENTION & REHABILITATION: SINGLE CASE STUDY

Can osteopathic manipulative treatment modify the posture in elderly people? — A single-case study

F. Pellerin [a], E. Papin-Richard [a], P. Guihéneuc [a,b], S. Niel [a], G. Guihard [b,*]

[a] *Laboratoire de Recherche Ostéopathique, Institut des Hautes Etudes Ostéopathiques de Nantes, Rue du Commandant Charcot, 44700 Orvault, France*
[b] *Laboratoire de Neurophysiologie Expérimentale, Faculté de Médecine, Université de Nantes, Place Ricordeau, 44035 Nantes Cedex, France*

Received 3 April 2014; received in revised form 22 June 2014; accepted 26 June 2014

KEYWORDS
Postural control;
Aging;
Fast Fourier transform;
Centre of foot pressure;
Falling;
Sway;
Manual therapy

Summary In this research, we have studied the consequences of three consecutive osteopathic manipulative sessions (OMS) on postural control by using a single-case research (SCR) design. The patient was a 77 years old woman complaining of altered balance and low-back pain. OMS were delivered by a single practitioner. The pain level was self-rated by using a visual Borg scale. The posture was monitored on a force platform. Postural parameters were deduced from the analysis of the centre of foot pressure (CoP) displacement. The statistical significance of the observed differences was established by using an SCR-related effect size indicator (i.e. Tau_{novlap}). Our results indicate that OMS decrease the patient's pain, modify CoP mean position and decreased the length and velocity of the CoP displacement. Furthermore, modifications of the body oscillations were observed after OMS. This work indicates that OMS can improve body balance and that SCR allows the objective evaluation of the consequences of OMS.

Introduction

Randomized controlled trials (RCT) have been successfully used for the evaluation of osteopathic and chiropractic manipulations, leading to recognized results and conclusions (Hodge and Downey, 2011; Posadzki and Edzard, 2011; Chaibi and Russell, 2012; Cerritelli et al., 2013). However, several practitioners have pointed to the inability of manual therapies to fit with RCT methodology, claiming that each patient is unique and that manipulative treatment has to be patient-specific (Littlewood, 2011; Milanese, 2011). Furthermore, the integration of a

* Corresponding author. Tel.: +33 (0)6 69 50 99 74.
E-mail address: gilles.guihard@univ-nantes.fr (G. Guihard).

http://dx.doi.org/10.1016/j.jbmt.2014.06.002
1360-8592/

placebo manipulation in the evaluation procedure is a controversial (Mein et al., 2001; Noll et al., 2004). Thus, the evaluation of osteopathic manipulations is still insufficiently documented and presents insufficient objective arguments (Brantingham et al., 2011; Jäkel and von Hauenschild, 2011; Pizzolorusso et al., 2011).

The single-case research (SCR) is a well-accepted method for physiological, psychological or behavioural characterization in single healthy subject. SCR principles can be obtained from various review articles (Nock et al., 2007; Rizvi and Nock, 2008; Romeiser Logan et al., 2008). The use of SCR is recommended when the constitution of research groups is unlikely, due to the very low occurrence of pathology, as in autoimmune manifestations (Takagi et al., 2011). It is also recommended when the recruitment of patients presenting a similar pathological development is difficult, as in autism (Lin et al., 2012) or as in traumatic brain injury (Hsieh, 2008). SCR can also be employed when the therapeutical protocol is customized to the status of the patient, as in physical rehabilitation (Hsieh, 2008; Klein et al., 2011; Lima-Gregio et al., 2011; Ross and Elliott, 2011; Arazpour et al 2013, Peter et al., 2012; Schubert et al., 2012; Smania et al., 2012). SCR has also been considered as a possible method for the scientific evaluation of manual therapies (Wolery and Harris, 1982; Sanders, 2003) and several reports argue for this (Maricar et al., 2009; Puentedura et al., 2010; Treleaven, 2010). Recently, SCR has been used to characterize the benefits of chiropractic manipulations on neck pain and headache (Montañez-Aguilera et al., 2010; Chaibi and Tuchin, 2011).

Conventional effect size cannot be calculated to estimate differences generated by a treatment *vs.* baseline in a single subject. Indeed, SCR avoids the use of inferential statistical tests. However, several works have proposed alternative methods for differences evaluation by using non-parametric distribution-free models (Parker and Vannest, 2009; Wolery et al., 2010; Parker et al., 2011a). Several indices can be determined from data pairwise comparison with statistical arguments, making these more convenient for estimating treatment-related changes (Parker and Vannest, 2009; Parker et al., 2011a and b).

In the present work, we hypothesized that the consequences of osteopathic manipulative treatment can be evaluated through a SCR analysis. We recruited an elderly woman who complained for body instability and low back pain. The patient was treated by three consecutive osteopathic manipulative sessions. Primary and secondary outcomes consisted in monitoring the displacement of the patient's centre of foot pressure (CoP) onto a force platform and the pain level before and after OMS.

Material and methods

Patient characteristics

The patient (recruited in December 2011 at IdHEO Osteopathic School, Nantes, France) was a 77 years old Caucasian woman (height = 1.60 m, weight = 70 kg, BMI = 27.3). Before the recruitment, the patient had never consulted an osteopathic practitioner. The patient declared to be a housewife and reported four pregnancies in 1964, 1966, 1967 and 1970. The first one was complicated by coccyx dislocation at the delivery; the last three proceeded without any complication. No perineum rehabilitation was required between pregnancy episodes. The patient did not exhibit any acute pathologies but was being pharmacologically treated for moderate arterial hypertension, vascular thrombosis, hyperlipidaemia, vitamin D deficiency and diffuse back pain episodes (over the previous six years). Treadmill walking did not reveal any cardiac dysfunctions. The patient's husband has become hemiplegic after a cerebro-vascular thrombosis in 2005. As a consequence of this, the autonomy of the patient's husband for feeding and personal hygiene was strongly diminished. The patient declared a strong physical involvement in the daily care of her husband. Furthermore, the patient reported two falling episodes during summer 2011. A NMR imagery of the head-neck region did not reveal any cerebral or spinal alteration. The absence of neuro-anatomical symptoms was noted.

At the time of the recruitment, the patient reported low back pain in the area of both sacroiliac joints that may have been related to physical efforts necessary for the daily care of her husband. Moreover, the patient complained of a general feeling of postural imbalance, not associated with vertigo. The patient had not undergone previous postural investigations before this study.

The patient was informed about the aim and the conditions of this study. She gave her informed consent according to the principles of the Helsinki declaration. The general conditions of the study were approved by IdHEO Nantes ethical committee composed by three senior osteopathic manipulators, two scientists (PhD) and one medical doctor (MD, PhD).

Monitoring of the postural control

The position of the centre of foot pressure (CoP) was determined by using the WinPosturo AFP 40/16 force platform and the WinPosture NV software (Medicapteurs France SAS, Balma, France). Three strain gauges form the three tops of a virtual equilateral triangle on the platform. The patient's feet were adjusted onto the platform by a removable plexiglass device so that the measures were realized reproducibly. In these recording conditions, the CoP position ideally corresponds to the triangle barycentre, the coordinates of which are 0 mm in both antero-posterior and medio-lateral directions. The antero-posterior and medio-lateral values of the CoP position of our patient were given as a function of this 0 mm reference. Left or right lateral shifts of the CoP position correspond to negative or positive medio-lateral values, while a front or rear shift corresponds to positive or negative values in the antero posterior direction.

The patient was asked to focus on a target located on a vertical wall, at 90 cm from her eyes. Furthermore, the patient was asked not to clench her jaw and to stand as still as possible during the time of recording (Zok et al., 2008).

The measures were repeated 5 times before and after each OMT session. Two consecutive measures were separated by a rest episode (duration: 30 s) during which the patient remained seated. For one measure, the CoP displacement was acquired for 51.2 s (acquisition