Increased Telomere Length and Improvements in Dysautonomia, Quality of Life, and Neck and Back Pain Following Correction of Sagittal Cervical Alignment Using Chiropractic BioPhysics® Technique: A Case Study

Fedorchuk C*, Lightstone DF, McCoy M and Harrison DE
425 Peachtree Parkway, Suite 315, Cumming, GA 30041, United States

Abstract

Objective: To present a prospective case study on the increase of telomere length, improvement in nocturnal polyuria, neck and mid-back pain, autonomic nervous system adaptability, and health-related quality of life following correction of the sagittal cervico-thoracic spinal alignment and posture using chiropractic biophysics® (CBP®) technique.

Clinical features: A 35-year-old white female elementary school teacher presented with chronic neck and mid-back pain for 5 years following a motor vehicle collision as well as nocturnal polyuria. Examination and radiography revealed forward head posture and loss of cervical lordosis consistent with vertebral subluxation. Patient telomere length was derived from nucleated white blood cells obtained from a blood test. Quality of life measures were determined by the Short-Form 36 health survey and heart rate variability was measured.

Intervention and outcome: The patient received CBP® spinal care including Mirror Image® corrective spinal exercises, adjustments, and traction. Full spine and drop table adjustments were administered. After 36 visits, she reported improvement in her nocturnal polyuria, neck and mid-back pain, and quality of life. Cervical x-rays showed correction of cervical lordosis and forward head posture. A blood test showed significant improvement in patient telomere length and heart rate variability improved from a health risk to within normal limits.

Conclusion: Our case suggests that correction of cervical lordosis and forward head postures by CBP® Mirror Image® methods improved the sagittal spinal alignment and posture and was temporally associated with lengthened telomeres, improved nocturnal polyuria, neck and mid-back pain, quality of life, and autonomic nervous system adaptability.

Keywords: Chiropractic BioPhysics®; CBP®; Adjustments; Traction; Cervical spine posture; Lordosis; Telomere length; Quality of life; Nocturnal polyuria; Vertebral subluxation

Abbreviations: CBP®: Chiropractic BioPhysics®; TL: Telomere Length; NP: Neck Pain; MVC: Motor Vehicle Collision; NRS: Numeric Rating Scale; HRV: Heart Rate Variability; AAI: Autonomic Activity Index; ABI: Autonomic Balance Index; S: Sym pathetic Nervous System; P: Parasympathetic Nervous System; SF-36: Short Form 36-Question Health Survey; QOL: Quality of Life; +TzH: Positive Translation of the Head in the Z-Axis; AP: Anterior-to-Posterior; NLC: Neutral Lateral Cervical; EMR: Electronic Medical Record; WNL: Within Normal Limits; Tz C2-C7: Translation of the posterior superior body corner of C2 with respect to a vertical line originating at the posterior inferior body corner of C7 in the z-axis as seen in the sagittal view of the cervical spine; APL: Atlas Plane Line; ARA C2-C7: Absolute rotational angle of the cervical region measuring the angle between the lines tangent to the posterior vertebral body margins of the C2 and C7 vertebrae in the sagittal view; CNS: Central Nervous System; n: Number of participants; RRA: Relative Rotational Angle; ARA: Absolute Rotational Angle; Tz: Translation in the z axis; PF: Physical Functioning; PRL: Physical Role Limitations; ERL: Emotional Role Limitations; EWB: Emotional Well-Being; V: Vitality; SF: Social Functioning; P: Pain; GH: General Health; ΔHS: Change in Health Status

Introduction

Human telomere length (TL) is affected by genetic and environmental factors [1]. TL is longest at birth and decreases with advancing age [2]. As such, telomere length is considered a biomarker of biological aging [2,3]. As telomeres shorten, cells can lose their ability to undergo cellular sequencing (replication and division) and may undergo apoptosis (cell death) [4]. In various cross-sectional studies, observations of shortened TL are associated with metabolic and inflammatory diseases [3,5], pulmonary diseases [3,6], cardiovascular events and diseases [3,7-10], psychological and stress disorders [3], neurodegenerative diseases [3], cancer [3,11], chronic and serious illnesses [3], and mortality [3,10]. Additionally, TL is associated with lifestyle choices such as diet, tobacco and alcohol use [12], physical activity, and sleep [3]. Fewer studies have focused on the dynamic change and regulation of TL by implementing exercise programs [13,14], vitamin supplements [15], diet [16], meditation [17], and genetic engineering [18]. Interest in telomere lengthening or length maintenance is due to the notion that this will serve to slow down or cease a person's biological clock providing youthfulness and health longevity [10]. It seems that implementation of healthy interventions or reduction of unhealthy stressors will have a beneficial effect on TL. The effects of chiropractic care on TL have not been studied.

*Corresponding author: Dr. Curtis Fedorchuk, 425 Peachtree Parkway, Suite 315, Cumming, GA 30041, United States, Tel: 7705732777; Fax: 7708881178; E-mail: cfedorchuk@comcast.net

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Neck pain (NP) and back pain are common presentations in chiropractic practices and chiropractic management thereof varies between practitioners [19]. Cervical spine misalignment resulting in vertebral subluxation remains an under-diagnosed cause of neck and back pain [20]. Common to all concepts or definitions of vertebral subluxation are some form of biomechanical dysfunction and the neurological implications of the biomechanical dysfunction [21,22]. This includes spinal and postural structural displacements as rotations or translations away from normal spinal alignment in any of the three anatomical planes accompanied by pain or neurologic dysfunction. Correction of vertebral subluxations toward a healthy spinal alignment can alleviate the associated pain or neurologic dysfunction [23,24]. Many chiropractic techniques claim to produce structural correction of the spine. However, very few support their claims with clinical scientific evidence in the form of randomized and non-randomized clinical control trials with proper follow-ups. Chiropractic BioPhysics® (CBP®) technique is a full-spine and posture rehabilitation approach to correcting poor posture, deviation of normal spinal alignment and subluxation through incorporating mirror image exercise, adjustments, and traction procedures [27-31]. CBP® has an extensive amount of quality scientific evidence supporting reliable correction of spinal and postural misalignment yielding improvements in concomitant neurological, musculoskeletal symptoms, spine movement, and patient disability levels [20,23,26,32,33]. It seems logical to propose that improvements in spinal and neurological health may have a beneficial impact on TL.

Case Report

Clinical features

A 35-year-old white female elementary school teacher presented to the office with the primary complaint of neck and mid-back pain for five years following a head-on motor vehicle collision (MVC) as well as nocturnal polyuria whereas she would need to wake up to urinate four times per night. The patient reported that she took generic, regular ibuprofen at bottle-recommended dosages 2 to 3 times per day for the 2 weeks immediately following the MVC. The patient reported that she had not and did not take any other medication. The patient had also sustained three prior MVCs in which she was rear-ended. The patient reported drinking three to five mountain dew soda drinks per day.

The patient weighed 120 pounds and measured 66 inches tall. She rated her NP and mid-back pain as a 5/10 on the numeric rating scale (NRS: 0=no pain; 10=maximum pain). Heart rate variability (HRV) was performed using the CLA Insight™ Pulse Wave Profiler HRV Monitor (Chiropractic Leadership Alliance, Bethany Beach, DE, USA) and the patient scored 75.35 on the autonomic activity index (AAI) (normal is 80.00 to 100.00) and 55.20(S) on the autonomic balance index (ABI) with increased sympathetic nervous system (S) activity (normal is 80.00(S) to 80.00(P) where P stands for parasympathetic nervous system activity) (Figure 1). Using Health and Wellness Score (FLDC LLC, Cumming, GA, USA) to administer, score, and analyze the Short Form 36-Question (SF-36) health survey, the patient scored a 50/100 in physical function (PF), 20/100 in physical role limitations (PRL), 33.33/100 in emotional role limitations (ERL), 35/100 in vitality (V), 76/100 in emotional well-being (EWB), 62.5/100 in social functioning (SF), 55/100 in pain (P!), 45/100 general health (GH), and 50/100 in change in health status (ΔHS) (Table 1).

Postural and radiographic analysis

Posture analysis [27] revealed a forward head translation (+TzH). Anterior-to-posterior (AP) and neutral lateral cervical (NLC) radiographs were taken and analyzed using PostureRay® Electronic Medical Records (EMR) Software (PostureCo, Inc., Trinity, FL, USA) according to the Harrison Posterior Tangent method for sagittal spine views [34-36] and analyses for frontal spine views (Figure 2) [37]. These examination and analysis methods are valid [38-42], reliable, and repeatable [34-38], as is posture [38].

### Table 1: Health and wellness score initial visit versus after 36 visits SF-36 health survey analysis.

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PF: Physical Functioning; PRL: Physical Role Limitations; ERL: Emotional Role Limitations; EWB: Emotional Well-Being; V: Vitality; SF: Social Functioning; P!: Pain; GH: General Health; ΔHS: Change in Health Status
The patient reported that her neck and mid-back pain were reduced by chiropractic care. After the 36 visits, the patient was re-assessed. The Denneroll was placed in the upper (C2-C4), middle (C4-C6), or lower (C6-T1) cervical region depending on the patient’s cervical alignment.

**Discussion**

This report documents the successful outcome in a 35-year-old patient with neck and mid-back pain and nocturnal polyuria as well as unhealthy spinal alignment and posture and autonomic dysfunction. Near complete resolution of symptoms was achieved following the correction of spinal alignment and posture using CBP® technique and the application of Mirror Image® chiropractic adjustments, spinal exercises, and spinal traction using the cervical denneroll spinal orthotic.

Certain circumstances and concurrences need to be highlighted within this report. First, the patient did not alter her lifestyle throughout her care. Most notable is that she continued to drink three to five Mountain Dew sodas per day and still yielded the extraordinary health improvements documented. The patient stated that chiropractic care was the only change in her everyday routine. Following correction of the cervical spinal alignment and posture, the patient’s HRV improved considerably from normal to normal, while Tz C2-C7 from 24.0 mm to 17.7 mm, in APL from -20.2° to -25.0°, and an ARA C2-C7 of -18.8° to -27.0° (Figure 2 and Table 2). The patient reported to be virtually pain-free and had been able to sleep through the night without having to go to the bathroom to urinate.

**Results**

The patient stated that she maintained her lifestyle throughout chiropractic care. After the 36 visits, the patient was re-assessed. The patient reported that her neck and mid-back pain were reduced from NRS 5/10 to <1/10. HRV was performed again and the patient improved to 80.38 on AA1 (normal is 80.00 to 100.00) and 88.51% on ABI (normal is 80.00±5 to 80.00±P) (Figure 1). On the SF-36, the patient improved in all QoL domains to 95/100 in PF, 100/100 in PRL, 100/100 in ERL, 75/100 in V, 88/100 in EWB, 100/100 in SF, 90/100 in PI, 70/100 in GH, and 100/100 in ΔHS (Table 1). Higher scores indicate better QoL. The patient had blood drawn again to assess her TL. Her telomere value increased 8.23% from 73 to 79. NLC x-ray (Figure 2) analysis (Table 2) after 36 visits revealed improvements in Tz C2-C7 from 24.0 mm to 17.7 mm, in APL from -20.2° to -25.0°, and an ARA C2-C7 from -18.8° to -27.0° (Figure 2 and Table 2). The patient reported to be virtually pain-free and had been able to sleep through the night without having to go to the bathroom to urinate.
One limitation to report is that this is a case study (n=1) and no long-term follow-up is presented; as such it does not allow correlation or causation. This is a prospective case study and as such does not lend itself to selection bias. Another limitation is that multiple interventions were applied to the patient. As such, it is unclear which intervention or combination thereof had the positive impact on the patient’s health measures. And, while spinal manipulation and exercise have not been shown to reliably correct spinal alignment [31,50-52], there may lie a reliable combination of therapies within permutations of Mirror Image® exercises, adjustments, and traction [23-26].

Conclusion

Our case suggests, for the first time, that cervical spinal alignment and posture may be directly related to TL (health longevity) and that correction thereof may have a directly related effect on health longevity as represented by TL. This case adds more evidence to claims that cervical spinal alignment may also improve autonomic function (HRV and bladder function), QoL, and neck and back pain. As cervical spinal alignment and posture improved, so did the listed health measures. Randomized clinical controlled trials involving measuring TL of a large population of chiropractic patients should be conducted. Hopefully this case report will serve as a motivation for higher levels of evidence from which correlations and causations regarding the effects that chiropractic spinal corrective care might have on health longevity can be made.

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References


