

# Case Study

## Reduction in Depression, Insomnia, Pre-Menstrual Syndrome & Dysautonomia in a Patient Undergoing Subluxation-Based Chiropractic Care Using Torque Release Technique

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### Abstract

**Objective:** To report on the outcomes of chiropractic management of a patient presenting with cervical, thoracic and lumbar subluxations and suffering from depression, insomnia, severe effects from pre-menstrual syndrome and headaches.

**Clinical features:** The patient, a 27-year-old female, arrived to the chiropractic office with the chief complaints of depression, insomnia, severe effects from pre-menstrual syndrome and headaches. She also occasionally suffered from dizziness, mood swings, buzzing in ears, stiff neck, constipation, menstrual pain, irritability, back pain, urinary problems, nervousness, upset stomach, cold feet and heartburn.

**Intervention and outcome:** The patient was diagnosed with vertebral subluxation complex at: cervical, thoracic and lumbar spinal segments. The patient's management plan consisted of chiropractic adjustments delivered to the patient's spine. On each visit, analysis was performed utilizing the Torque Release Technique indicators for subluxation and then an adjustive thrust was performed at these levels, utilizing the Integrator adjusting instrument. After three months of chiropractic care, the patient's subjective and objective outcomes significantly improved. The regularity and severity of patient's depression-related symptoms improved from "moderate" to "mild".

**Conclusion:** This case report suggests that chiropractic care utilizing Torque Release Technique may be safe and efficient in the management of female patients suffering from depression and related symptoms, insomnia, headaches and PMS-related symptoms.

**Key Words:** *chiropractic, depression, quality of life, Torque Release Technique, vertebral subluxation, adjustment*

### Introduction

Depression is one of the most common mental disorders affecting about 16% of the general population.<sup>1</sup> Depression is more prevalent among women; 10-25% of women suffer from depression and 5-12% of men.<sup>2</sup> The symptoms include: long-lasting depressed mood, loss of interest or pleasure in hobbies and activities that were once enjoyed, decreased energy, fatigue, feelings of worthlessness, feelings of helplessness, feelings of guilt, feelings of anxiety, difficulty concentrating, difficulty making decisions, insomnia, early-morning awakening or oversleeping, weight loss or weight gain, recurrent thoughts of death and or suicide.<sup>1,3,4</sup>

The theories explaining the causes of depression vary and an exact pathophysiology still remains unknown.<sup>1</sup> Regardless of the causes and initial triggers, the common pathway of this disorder involves biochemical changes in the brain.<sup>3,4</sup> Research suggests that this might be due to the following: imbalances or deficiencies in serotonin, GABA, dopamine and opioid peptides levels; genetic factors; stress response circuits (the hypothalamic-pituitary axis); affective trauma; viral infection; neurodevelopmental abnormalities; brain derived neurotrophic factors; norepinephrine-dopaminergic interactions; decreased adult hippocampal neurogenesis; histone modifications; circadian rhythms; substance abuse

withdrawal; and changes in functional brain anatomy.<sup>1,3-5</sup> The contribution of genetic factors in development of depression is around 40-50%.<sup>1</sup> The exact mechanism and which combination of which factors leads to the development of depression has yet to be defined.<sup>1</sup>

The onset of depression varies, as it usually takes days or weeks for the symptoms to develop. Depression may also have a very sudden onset, especially when a severe stress or trauma occurred.<sup>4</sup> Medical treatment mainly involves pharmacological agents (antidepressant drugs), psychotherapeutic interventions, somatic therapies or their combination.<sup>4,5</sup> The most effective antidepressants are: selective serotonin reuptake inhibitors, selective norepinephrine reuptake inhibitors, and tricyclic and tetracyclic inhibitors.<sup>5</sup> Other promising medical treatments include: substance P antagonists, transcranial magnetic stimulation, electroconvulsive treatment (ECT), and cognitive-behavioral therapy.<sup>6</sup> However, although promising, medical interventions have only limited success, the effectiveness of antidepressants, for instance, have been estimated at 50%.<sup>5</sup> The duration of the successful treatment or the right combination of various treatments or the reasons behind numerous side effects still remain unknown.

The use of complementary and alternative medicine is common among people with depression.<sup>7</sup> More than 50% of people diagnosed with depression report using complementary and alternative medicine.<sup>7</sup> The most common reasons are: dissatisfaction with medical care, especially severe side-effects of medical treatments; safety of CAM approach; “natural approach” and “philosophical orientations towards health and life” represented by CAM makes it an attractive alternative for people who want to stay aligned with their values.<sup>7</sup> Chiropractic is one of the three most commonly utilized therapies although the evidence supporting chiropractic management in treatment of non-musculoskeletal conditions, including depression, is rather limited.<sup>7,8</sup> Depression is a seriously undertreated condition with less than 40% of affected people receiving adequate treatment for their disorder.<sup>7</sup> The cost incurred by individuals, their families, communities and the society as a whole is substantial and research in this field is of high importance.

The purpose of this case study was to report on the outcomes of chiropractic management of a patient suffering from depression, insomnia, severe effects from pre-menstrual syndrome (PMS) and headaches.

## Case Report

### *Patient History*

The patient, a 27-year-old female, arrived to the chiropractic office with the chief complaints of depression, insomnia, severe effects from pre-menstrual syndrome (PMS) and headaches. The patient indicated that she also occasionally suffered from dizziness, mood swings, buzzing in ears, stiff neck, constipation, menstrual pain, irritability, back pain, urinary problems, nervousness, upset stomach, cold feet and heartburn.

The patient's birth history included cesarean section and very

long labor. She was vaccinated, hospitalized and underwent a surgery as a child. The patient was currently taking Prozac to help her with depression and anxiety. She was also suffering from sinus infections and allergies. The patient's work-related stress level was rated at 6/10 (1 = none, 10 = extreme) and her personal-related stress level was rated at 4/10. The patient rated her eating habits at 5/10 (1 being very poor, 10 being excellent), exercise habits at 3/10, sleep at 4/10 and general health at 6/10. The patient also had work-related health complaints (she is a teacher) of foot and back pain.

## Chiropractic Examination

Chiropractic examination consisted of posture analysis, complaints-related subjective questionnaires, autonomic activity analysis, surface electromyography (sEMG) and thermal scan.

### *Posture Analysis*

Posture analysis showed the following: the patient's head was shifted 0.35" right and tilted 3.49° right; shoulders were not shifted significantly and were not tilted; ribcage was shifted 0.5" right, hips were shifted 0.4" right and were not tilted; head weighed approximately 20.3 lb and was shifted 2.03" forward; based on physics, the patient's head effectively weighed 61.5 lb instead of 20.3 lb; shoulders were shifted 1.15" backward; knees were shifted 1.38" forward.

### *Depression-related Questionnaires*

Depression assessment questionnaire contained 25 signs or symptoms associated with depression. For each sign or symptom, the patient needed to evaluate its regularity (never, rarely, sometimes, often, always) and severity (none, mild, moderate, severe, unbearable). Regularity and severity are rated on a scale from 0 to 100 (lowest to highest). The final score is a sum of two components and is between 0 and 200 points (0 being minimal severity of depression and 200 being the highest).

Regularity of patient's symptoms was rated at 54/100 and severity of symptoms was rated at 42/100 (see Table 1), giving a total score of 96/100, which indicated moderate depression (moderate depression falls between 81-120/200).

Similar questionnaires were used to evaluate other complaints - levels of sleep disturbance, menstrual cycles and symptoms from pre-menstrual syndrome, headaches and digestive system. Regularity of patient's sleep-related symptoms was rated at 52/100 and severity of symptoms was rated at 21/100, giving a total score of 73/200, which indicated mild severity of sleep disturbance. Regularity of patient's PMS-related symptoms was rated at 46/100 and severity of symptoms was rated at 32/100, giving a total score of 78/200, which indicated mild severity of PMS. The severity of patient's digestive system's symptoms was rated at 69/200, which indicated mild severity and the severity of patient's headaches was rated at 72, which indicated mild severity as well.

### *Heart Rate Variability Analysis*

Heart rate qualitative analysis is a common method of

assessing the sympathetic and parasympathetic components of the autonomic nervous system, which reflects the health status of a patient.<sup>9</sup> Since vertebral subluxations also have an autonomic component, HRV analysis along with other outcome measures can be used to assess vertebral subluxations.<sup>10</sup>

Frequency domain analysis was performed for heart rate variability (HRV). Autonomic Activity Index (AAI) and Autonomic Balance Index (ABI) were used to monitor the outcomes. AAI reflects the levels of sympathetic and parasympathetic activity, while ABI reflects the balance degree of the autonomic nervous system. HRV analysis showed: Autonomic Activity Index at 99.19 and Autonomic Balance Index at 85.5(P). ABI showed significant deviation from balance of the autonomic nervous system.

### *Surface EMG*

sEMG records electrical potentials associated with muscular activity and is used for the examination of paraspinal and peripheral muscle function. A deviation from a normal paraspinal muscle function is generally accepted as a clinical manifestation of vertebral subluxation. sEMG tracks changes in paraspinal myoelectric activity that are associated with vertebral subluxations. sEMG has been recognized as a reliable outcome measure to assess vertebral subluxations.<sup>11</sup>

sEMG showed the following readings: mild at C1 on the left, moderate at C1 on the right and C3 on the left, and severe at L3 on the right.

### *Thermography Report*

Changes in skin temperatures are highly correlated with dysfunction of the autonomic nervous system.<sup>12</sup> The assessment of the skin temperatures is therefore used to evaluate the loss of nervous system adaptability in response to internal and external changes.<sup>10</sup> Thermal scanning has been shown to be a valid method of detecting differences in skin temperature. Since vertebral subluxations often result in thermal asymmetries, thermal scanning is also a highly reliable outcome assessment tool in the management of the patient's vertebral subluxations and response to chiropractic care.<sup>12</sup>

Thermography report showed mild asymmetries at T7 (right), T9 (right), T12 (left) and L1 (left) and severe asymmetries at C1-C3 (right), T10 (right), T11 (right) and L3 (left). Moderate asymmetries were not found at all.

### *Diagnosis*

The patient was diagnosed with vertebral subluxation complex at: cervical, thoracic and lumbar spinal segments. This was characterized by severe asymmetry of thermal readings in the cervical, thoracic and lumbar spinal regions, severe abnormality of sEMG readings in the lumbar spinal region and related to abnormal posture.

### **Chiropractic Care**

The patient's management plan consisted of chiropractic

adjustments delivered to the patient's spine. On each visit, analysis was performed utilizing the Torque Release Technique indicators for subluxation and then an adjustive thrust was indicated and performed at these levels, utilizing the Integrator adjusting instrument. The patient was undergoing chiropractic care at a frequency of 3-4 times a week.

Torque Release Technique is a tonal chiropractic technique and its primary objective is to release tension patterns in the spine, which are caused by primary subluxations. "Tonal" means that "the technique relies upon real-time interaction with the nervous system to determine where, when, and how to adjust."<sup>13</sup> Torque Release Technique integrates the evidence based physical examination protocols and indicators from seven different chiropractic techniques: Directional Non-Force Technique, Palmer Upper Cervical, Network Spinal Analysis, Sacro-Occipital Technique, Logan Basic, Thompson Terminal Point, and Toftness.<sup>14</sup> The technique utilizes fifteen indicators for locating vertebral subluxations, which include palpation, functional leg length reflex, abductor tendency, foot flare, foot pronation / supination, achilles tension, abnormal breathing patterns, inappropriate sustained patterns of paraspinal contractions, congestive tissue tone, postural faults, Cervical Syndrome Test, Bilateral Cervical Syndrome Test, Derefield Test, "Wrong-un" Test, and abnormal heat or energy radiation from the body.<sup>14</sup> Next, a non-linear system is used to determine the order of subluxations to be adjusted.<sup>15</sup> "Non-linear" indicates that there is only one primary subluxation to adjust at any given moment. Maximum of three segments can be adjusted on any given visit. It implies that no segments will ever be adjusted in the exact same order, any three visits in a row.<sup>13</sup> The adjusting protocol uses the Integrator (a hand-held instrument delivering a rapid and precise thrust to the site of subluxation), an automatic release mechanism and a torque and recoil component.<sup>15</sup>

Torque Release Technique protocol performed on the patient's first visit revealed subluxations at C2, occiput and S2. Each time, the same protocol was applied to detect and correct vertebral subluxations. The patient's recovery, evaluated during each visit, was steady and consistent.

### **Outcomes**

After the first re-assessment three months later the patient's subjective and objective outcomes significantly improved (see Table 2).

Posture analysis showed the following: the patient's head was not shifted significantly left or right and was tilted 2.45° right; shoulders were shifted 0.57" left and were tilted 2.95° left; ribcage was not shifted significantly left or right; hips were not shifted significantly and were not tilted; head weighed approximately 20.3 lb and was shifted 1.13" forward; based on physics, the patient's head effectively weighed 43.3 lb instead of 20.3 lb; shoulders were shifted 0.5" forward; hips were shifted 0.92" forward; knees were shifted 0.8" forward.

Regularity of patient's depression-related symptoms was rated at 28/100 (was 54) and severity was rated at 22/100 (was 42), giving a total score of 50/200 (see Table 3), which indicated mild depression (mild depression falls between 41-80/200).

Regularity of patient's sleep-related symptoms was rated at 32/100 and severity of symptoms was rated at 28/100, giving a total score of 60/200, which indicated mild severity of sleep disturbance. Regularity of patient's PMS-related symptoms was rated at 25/100 and severity of symptoms was rated at 17/100, giving a total score of 42/200, which indicated mild severity of PMS. The severity of patient's digestive system's symptoms was rated at 34/200, which indicated minimal severity and the severity of patient's headaches was rated at 59, which indicated mild severity as well.

HRV frequency domain analysis showed improvement in the patient's autonomic nervous system activity and balance. AAI increased from 99.19 to 110.99 and ABI improved from 85.5(P) to 93.50(S). HRV analysis indicated that the patient's nervous system became more healthy and balanced after three months of chiropractic care.

sEMG showed significant improvement in the lumbar spine - the reading was mild (7.4) at S1 on the left from severe (19.6) at L3 on the right.

Thermography report showed significant improvement. Mild asymmetries were found at C6 (right), T2 (right), L2 (left) and L5 (left). Moderate asymmetries were found at T3-T5 and T7 (all on the right). Severe asymmetries were found at L3 (left) and L4 (left).

## Discussion

Chiropractic research regarding women suffering from depression is of particular importance because of the high rate of use of CAM therapies (including chiropractic) among female population.<sup>7</sup> Reported reasons typically concern inefficiency of medical treatments and their side effects. In the study by Wu et al, medical treatment was unsuccessful for 43% of respondents and 45% experienced unpleasant side effects.<sup>7</sup> Possible side effects of medical interventions may include: sexual dysfunction, glucose intolerance, dyslipidemia, weight gain, abdominal (central) obesity, insomnia, somnolence, apathy, hypertension, tachycardia, significant effects on memory and cognitive function, anticholinergic side effects, sedation, orthostatic hypotension; some pharmacological agents can affect cardiac conduction and are lethal in overdose.<sup>2,6</sup> Some of those side-effects are indicative of metabolic syndrome, which increases the risk of developing cardiovascular disease and type 2 diabetes mellitus.<sup>2</sup> Almost half of patients (48%) with depression report metabolic syndrome.<sup>2</sup>

Although there are many approaches for depression, chiropractic is considered a viable management option.<sup>16</sup> The major motivating factors behind the use of chiropractic care is its safety and its natural, health-oriented approach.<sup>7</sup> In the current case, the patient presented with moderate depression, mild sleep disturbances, mild headaches and reported mild symptoms from pre-menstrual syndrome and mild severity of digestive system symptoms. The patient's overall health was not optimal, quality of life and well-being was decreased. After three months of chiropractic care, the patient's depression-related symptoms significantly decreased and the patient reported an increase in overall health, well-being and quality of life.

Currently, there is little scientific evidence reporting on the correlation between vertebral subluxations and depression, well-being and the quality of life. However, the correction of vertebral subluxations has been suggested to improve general health, brain function, quality of life and well-being.<sup>17,18</sup> This result is particularly important for patients presenting with depression, who also experience deterioration of health, well-being, quality of life, and brain function (since depression has been linked to decreased brain function).

There is some evidence suggesting effectiveness of chiropractic care in managing people with depression.<sup>2-5,16,19,21</sup> Those studies report on patients suffering from depression undergoing chiropractic care. The outcomes show that patients improve in numerous areas of their life. The patients report that their physical, mental and social health improves and that depression-related symptoms are reduced or completely disappear.<sup>4,16,19</sup> The patients report being happy once again, satisfied with personal life, job, and themselves, and often cease taking prescribed medications or quit smoking.<sup>2,3,5,21</sup>

In the current case report, both subjective and objective outcome measures were utilized to monitor the patient's progress. While subjective questionnaires showed a significant improvement in depression-related symptoms, quality of life and well-being, the objective outcome measures indicated successful management of vertebral subluxations as shown by sEMG and thermography reports. Since cervical, thoracic and lumbar subluxations were reduced or corrected while the patient was under chiropractic care and the patient did not introduce significant lifestyle changes, it may be suggested that the improvement in depression-related symptoms, overall well-being and quality of life was directly related to reduction or correction of vertebral subluxations.

Since neurochemical alteration (including abnormal levels of dopamine, serotonin) has been identified as the pathological process involved in depression, it may be suggested that restoration of chemical balance in the brain would eliminate depression and related symptoms.<sup>19</sup> The exact mechanism explaining significant improvement of depression is unknown, however a few theories have been proposed to explain this phenomenon. According to Reward Deficiency Syndrome theory, feelings of well-being are expressed through the reward cascade of neurochemicals, including neuropeptides. When the neuropeptides and receptors are functioning properly, neurochemicals attach to specific receptors, which initiates the process of the "reward cascade" leading to feelings of well-being. When the reward cascade is interrupted or distorted, either by an imbalance or deficiency of neurotransmitters, the feelings of well-being are exchanged for anger, anxiety, depression (called Reward Deficiency Syndrome).<sup>20</sup>

This theory can provide a potential explanation of why vertebral subluxations play a role in decreased expression of well-being. By decreasing the proper neurological function and biochemical balance of the body, vertebral subluxations may alter and disrupt the reward cascade, leading to mood changes and - if not reduced or corrected - deterioration of well-being and quality of life.

Although it has been suggested that the correction of vertebral

subluxations is an important component of improvement of health and well-being, it is not the only factor influencing those variables.<sup>21</sup> The patient's health, well-being and subjective quality of life have been linked to multiple psychological, social and spiritual factors, which constitutes a challenge when managing patients presenting with depression and various depression-related symptoms.

## Conclusion

The patient reported on in this case presented with depression, insomnia, headaches and symptoms from pre-menstrual syndrome. She was also diagnosed with cervical, thoracic and lumbar vertebral subluxations. The adjustments were delivered according to Torque Release Technique and resulted in reduction or correction of vertebral subluxations, which initiated the healing process. After three months of care, the patient's health significantly improved in all areas of complaints (48% improvement in depression, 18% improvement in insomnia, 46% improvement in PMS-related symptoms, 51% improvement in digestive system's symptoms and 18% improvement in headaches). Since there were no other lifestyle changes involved, this case report suggests that chiropractic management may improve neurological function and biochemical balance of female patients suffering from depression and related symptoms, insomnia, headaches and PMS-related symptoms.

The limitation of this study is that it reports only on one patient, who presented with a very specific set of complaints. The conclusions and results obtained in this study cannot be therefore applied to all patients presenting with depression. Another limitation is the use of subjective outcome measures, which involves the patient's own perception of health and her own interpretation of questions. The number of studies on chiropractic management of depression is still very limited. More research is needed in this field to determine the role of chiropractic in the management of depression.

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	REGULARITY					SEVERITY				
	Never	Rarely	Sometimes	Often	Always	None	Mild	Moderate	Severe	Unbearable
sad, down or miserable			X					X		
lost interest or pleasure in most or usual activities			X				X			
increased or decreased weight				X					X	
feel slowed down, restless or excessively busy				X				X		
feel tired or no energy				X				X		
feel worthless			X				X			
feel guilty		X					X			
poor concentration				X					X	
difficulties thinking				X				X		
indecisive				X				X		
recurring thoughts of death		X					X			
nervous or tense				X					X	
unhappy or depressed			X					X		
things getting on top of you			X				X			
poor self-confidence			X					X		
increased need for speed				X				X		
poor quality sleep				X					X	
tired or sore muscles after activity		X					X			
feeling under pressure				X				X		
unable to overcome difficulties		X					X			
feel hopeless		X					X			
emotionally detached		X					X			
anti-social			X				X			
headaches			X				X			
sad, down or miserable			X					X		

**Table 1: Regularity and Severity of Patient Symptoms**

	INITIAL VISIT	REASSESSMENT (3 months later)
<b>Posture Analysis</b>		
head	shifted 0.35° right	
	tilted 3.49° right	tilted 2.45° right
	20.3 lb	20.3 lb
shoulders	shifted 2.03° forward	shifted 1.13° forward
	shifted 1.15° backward	0.57° left
		tilted 2.95° left
		shifted 0.5° forward
ribcage	shifted 0.5° right	
hips	shifted 0.4° right	shifted 0.92° forward
knees	shifted 1.38° forward	shifted 0.8° forward
<b>Depression-related Subjective Questionnaires</b>		
Depression assessment questionnaire	Regularity = 54/100 Severity = 42/100 Total = 96/200	Regularity = 28/100 Severity = 22/100 Total = 50/200
Sleep-related symptoms	Regularity = 52/100 Severity = 21/100 Total = 73/200	Regularity = 32/100 Severity = 28/100 Total = 60/200
PMS-related symptoms	Regularity = 46/100 Severity = 32/100 Total = 78/200	Regularity = 25/100 Severity = 17/100 Total = 42/200
Digestive system's symptoms	69/200	34/200
Headaches	72/200	59/200
<b>Heart Rate Variability</b>		
Autonomic Activity Index	99.19	110.99
Autonomic Balance Index	85.5(P)	93.50(S)

**Table 2: First re-assessment three months later showed improvement in subjective and objective findings**

	REGULARITY					SEVERITY				
	Never	Rarely	Sometimes	Often	Always	None	Mild	Moderate	Severe	Unbearable
sad, down or miserable			X				X			
lost interest or pleasure in most or usual activities			X				X			
increased or decreased weight			X				X			
feel slowed down, restless or excessively busy			X					X		
feel tired or no energy			X				X			
feel worthless	X					X				
feel guilty	X					X				
poor concentration			X					X		
difficulties thinking		X					X			
indecisive		X					X			
recurring thoughts of death	X					X				
nervous or tense			X					X		
unhappy or depressed		X					X			
things getting on top of you	X					X				
poor self-confidence		X					X			
increased need for speed		X					X			
poor quality sleep		X					X			
tired or sore muscles after activity	X					X				
feeling under pressure			X				X			
unable to overcome difficulties	X					X				
feel hopeless		X					X			
emotionally detached		X					X			
anti-social		X					X			
headaches		X					X			
sad, down or miserable			X				X			

**Table 3: Regularity and Severity of Patient Symptoms after three months**