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The *Journal of Clinical Chiropractic Pediatrics* welcomes original and scholarly manuscripts for peer-review and consideration for publication. Topics must pertain to the field of pediatrics which includes pregnancy and adolescence. Manuscripts should not have been published before or submitted to another publication.

The following will be considered:

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Controlled, Large Scale Studies — usually, but not necessarily, performed at a college or research facility. May be double-blinded.

Commentaries — presentations of opinion on trends within the profession or current events, pertaining to pediatric and adolescent chiropractic care.

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From journals —

Gorman JF. Automatic static perimetry in chiropractic. *J Manipulative Physiol Ther* 1993; 16(4):481-7.

From books —

Gatterman MI. Chiropractic management of spine related disorders. Baltimore: Williams & Wilkins; 1990.

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All manuscripts deemed appropriate for publication by the editor will be sent *blind* to at least two reviewers. If the manuscript is accepted, the author will be notified. If substantive changes are required, the paper will be returned to the author and the author must re-submit a clean copy of the revised manuscript. Author will be given a tentative

date for publication if accepted.

Manuscripts not accepted for publication will be returned to the author without comment.

Summary of manuscript submission

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8. Digital files to be sent to svallonedc@aol.com.





Editorial

Dear Reader:

In this issue of *JCCP* we offer case reports written by chiropractors in the field that cover clinical highlights and chiropractic management of the pregnant and postpartum adult female with preeclampsia and pelvic floor instability, to children with challenges ranging from tongue ties to gluten sensitivities. There is also a commentary providing current information on the dangers of abuse of energy drinks by our youth.

The value of case reports to the practicing clinician cannot be underestimated. A case report describes unique aspects of a clinical case and provides a significant function in medicine (... and chiropractic) given its rapid, succinct and educational contribution to scientific literature and clinical practice. Despite the emphasis on randomized clinical trials and evidenced-based medicine, case reports can continue to provide novel and exceptional knowledge in clinical education (Cabán-Martínez/García-Beltrán, 2012)¹

For the chiropractic profession to build a stronger foundation of published evidence-based outcomes lit-

erature we need to become more creative and pool our resources. To this end, *JCCP* co-editor, Dr Cheryl Hawk, and researcher, Dr Katherine Pohlman have proposed a collaborative effort between researcher and clinician through a new pediatric practice-based research network, ICON-PedCaReNet.

I strongly encourage all of our readers and colleagues to consider participating in what could be a profession-wide collaboration to provide the evidence that will support our patients in getting the services they need and perhaps even support our colleagues in receiving the recognition and reimbursement due them for their services.

In health,



Sharon Vallone, DC, FICCP

Co-Editor

Journal of Clinical Chiropractic Pediatrics

1. Cabán-Martínez AJ. García-Beltrán WF. Advancing medicine one research note at a time: the educational value in clinical case reports. *BMC Research Notes* 2012, 5:293 doi:10.1186/1756-0500-5-29.

ICON-PedCaReNet: A New Pediatric Practice-Based Research Network with a Focus on Wellness

Cheryl Hawk, DC, PhD and Katherine Pohlman, DC, MS, DICCP

*"If we want more evidence-based practice, we need more practice-based evidence."*¹

Definition of Practice-Based Research Network (PBRN)

The U.S. Agency for Healthcare Research and Quality (AHRQ) defines a PBRN as a group of clinicians and practices working together in ambulatory care to answer community-based health care questions and translate research findings into practice.²

PBRNs address research questions that require a real-world setting to be answered. Ambulatory care settings, partnering with academic institutions, form the "laboratory" in which these research questions are pursued.

The Integrated Chiropractic Outcomes Network (ICON) is a PBRN established in 2011, with the pediatric specialty group (PedCaReNet) established in 2012. ICON is an interinstitutional collaboration combining the expertise of experienced investigators who have conducted a number of practice-based research studies in other venues. ICON is intended to be an "engine" that can drive projects that require a real-world ambulatory care setting in order to answer a specific research question. **ICON's mission is to conduct collaborative research through a partnership between researchers and practitioners with the ultimate goal of enhancing the health of the public and contributing to the scientific evidence base related to health promotion and disease prevention.**

Chiropractic research, to date, has focused more on pain and symptom management than on prevention and health promotion, even though chiropractic has traditionally considered itself to be prevention-oriented.³ However, in a time when lifestyle factors have become the leading actual causes of death,⁴ research into the role of chiropractic in disease prevention and health promotion must become a priority. At this time, such evidence is scarce. Some studies have shown that wellness care accounts for a significant proportion of chiropractic patient visits,⁵⁻⁷ and others suggest that patients receiving chiropractic care appear to be healthier than patients who do not,^{6,8} however,

a cause-and-effect relationship between wellness care and improved long-term health outcomes has yet to be clearly demonstrated.

The Importance of Observational Studies in Health and Wellness Research

Practice-based research study designs are usually observational. Observational studies make important contributions to the scientific evidence base. They are particularly suited to investigating complex clinical interactions such as those involved in providing patients with health promotion counseling. A prospective analytic study, an observational design which examines relationships among a number of variables, can be used to investigate a complex, real-life intervention designed to prevent illness and improve health among ordinary patients. This type of study can evaluate risk factors for negative health outcomes, which is consistent with a model of health rather than disease. It enables investigators to gather information on factors which precede, and may contribute to, either improved or impaired health. Because it is prospective, this is a very strong design for establishing that the variables of interest did, in fact, precede the outcome of interest. Since existing evidence related to chiropractic wellness care has not been able to determine whether healthier patients seek chiropractic care or chiropractic care makes patients healthier, this issue is essential.

The Role of Practice-Based Research

One important reason for the underutilization of prospective observational designs in chiropractic research

is the high cost and logistical complexity of assembling and following an appropriate cohort. PBRNs have been used in other health professions as well as chiropractic for many years to investigate ways to improve clinical practice, including the delivery of health promotion and prevention services.⁹⁻¹³

A Call for Participation in ICON and ICON-PedCaReNet

ICON's next project will investigate chiropractic wellness care. Wellness care, often called "maintenance care," is consistent with chiropractic philosophy, is widely accepted by the profession as an integral part of chiropractic practice and comprises a significant portion of that practice. However, to date, the body of evidence supporting both the effectiveness and the optimal protocols for wellness care can, at best, be considered emergent.¹⁴⁻²¹ Thus, a cause-and-effect relationship between wellness care and improved long-term health outcomes has yet to be clearly demonstrated. This study is designed to add to the evidence base on this important topic.

ICON-PedCaReNet's first project will evaluate the safety of chiropractic adjustments. Literature on this topic has mostly been retrospective reviews,²²⁻²⁴ which rely on spontaneous reporting. This prospective review will evaluate surveillance methods in their ability to successfully develop a reporting and learning system for the pediatric chiropractic profession.

There are no costs to doctors or patients for participating in this study. All participating doctors will receive a report of the study's findings, and will be acknowledged in any resulting publications.

PBRNs are designed to minimize intrusion into the participating practices. The investigators and the practitioners will form a partnership to "put research into practice."

ICON investigative team

- Cheryl Hawk, DC, PhD, CHES, program director – Logan College of Chiropractic
- Ronald Rupert, DC, MS, investigator – Parker College of Chiropractic
- Harrison Ndetan, MSc, MPH, DrPH, biostatistician – Parker College of Chiropractic
- Katherine Pohlman, DC, MS, DICCP, PedCaReNet director – University of Alberta

- Jay Greenstein, DC, CCSP – private practice
- Michelle Anderson, program coordinator – Logan College of Chiropractic

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A Commentary on the Threatened Health of the Current Pediatric Generation

By Miela Gruber-Cooley, ND

I am a naturopath. I am fortunate enough to work in a multidisciplinary environment collaborating with a pediatric chiropractor and a number of therapists who work exclusively and collaboratively with children with special needs. I come to work each day with gratitude and a driving concern for the current generation of children and their threatened health. I am deeply concerned with the level of poor health that this generation is challenged with. Today we are witness to a disturbing and rapid increase of many chronic illnesses in our children, some of them severe and debilitating. Autism is probably one of the most rapidly escalating chronic illness in children currently in the public eye, reaching what many are calling epidemic proportions.

The staggering increase in the rate of autism is the most dramatic, now being reported as 1 in 88 children.^{1,2} Twenty-five years ago, the autism rate was 1 in about 10,000. At the onset of this epidemic, there were claims that the increase could be attributed to better diagnosis, or changed diagnostic categories. Perhaps that accounted for a modest increase in the beginning, but as the diagnostic requirements and awareness have now been unchanged in the last several years, these claims are no longer adequate explanations. This is frightening, and it is irresponsible to turn and look the other way or hide our heads in the sand. And, as serious as this situation is, what doesn't get as much airtime, but should be just as much a concern, is that many other chronic illnesses beset this generation of children as well. For perspective, here are some statistics on a few of the common health challenges that we see regularly in our office.

Apraxia of speech: Exact rates are not known. As with other complex neurobehavioral disorders (e.g., autism, attention deficit hyperactivity disorder (ADHD)), the prevalence of childhood apraxia of speech (CAS) has reportedly increased substantially during the past decade. For example, in a study of 12,000 to 15,000 estimated diagnostic outcomes for children referred with speech delay of unknown origin from 1998 to 2004, a staff of 15 speech-language pathologists in a large metropolitan hospital diagnosed 516 (3.4%-4.3%) of these children as having suspected CAS.³

Asthma: CDC data and surveillance reported in 2010 that asthma in children was up to 9.5% of children (11.1% male to 7.8% female children), and that in many areas, including Hartford county where we are located, is almost 25%. Between 1980 and 1996 asthma increased by 73%. The cause for the increase is unknown despite extensive tracking efforts in several states.⁴

ADHD (diagnosed): Increased by an average of 3% from 1997-2006, and 5.5% a year between 2003 and 2007. The current rate in the US is 9.5% of all children, 13% of boys. The cause of this increase is unknown.^{5,6}

Bipolar disorder: The number of children and adolescents diagnosed with bipolar disorder has increased by 40% in the last decade. Additionally, the age at which children are being diagnosed with bipolar disorder has changed, with some children now being diagnosed as young as four years old. Some argue that severe ADHD is sometimes misdiagnosed as bipolar disorder, which would increase the rates of ADHD listed above by default. The cause is unknown.^{7,8,9}

Food allergies: from 1997-2007, the prevalence of reported food allergy increased 18% in children under 18.¹⁰

Anxiety disorders: 8-10% of children. This category of psychiatric illness includes separation disorder, obsessive compulsive disorder, generalized anxiety disorders, overanxious disorder, panic disorder, and selective mutism. The cause of this high rate is unknown.¹¹

Tourettes / chronic tic disorder: .5-2% of children are now diagnosed with this disorder.^{12,13}

More generally, studies show that at least one child in five now has a mental, emotional or behavioral problem, one in 10 children have a mental illness severe enough to cause extreme functional impairment. 10-13% of pediatric visits each year are for psychosocial problems.^{14,15,16}

Conventional pediatrics is unequipped to deal with these chronic illnesses, which are multifactorial and mul-

tisystemic by nature, involving the interplay between the environment, the musculoskeletal system (spine and cranium), the nervous system, the immune system, the organs of detoxification, and nutritional status. On the other hand, I have found integrating chiropractic with functional, biomedical and traditional naturopathic medicine is uniquely suited to help heal these injured children. When we look at the “whole” child, we look at their structural integrity and the absence or presence of subluxation, their nutritional imbalances, genetic differences and individuality in processing toxins, metabolic and mitochondrial differences, and other underlying barriers to health (like subluxation), rather than masking illness for a lifetime. Many children have made incredible strides this year.

It is clear that we as a society have done a disservice to this generation of children, they are far sicker than previous generations. It is clear that this generation of children, compared to previous generations, from birth, is starting further from home plate. Unfortunately, there is little that modern pediatrics is offering to these children and the families who love them. The research is not being done into what is poisoning them, and many of them are considered “incurable”. For many children, the treatment may be worse than the disease. Depression for example is treated with SSRI’s. However, the long term effects of antidepressants on children’s nervous system have not been studied, and the Surgeon General has issued a warning that children using these medications may experience suicidal thinking and behavior.¹⁷ The FDA warns that children taking stimulant medication for ADHD are at risk for serious cardiac and cardiovascular risks — including sudden death.¹⁸ Other side effects of ADHD medications can include nervousness, sleeplessness and insomnia, headache, loss of appetite and slowed growth, jitteriness, social withdrawal, tics and agitation. Non stimulant ADHD medication side effects include anxiety, agitation, panic attacks, insomnia irritability, aggressiveness and mania.

In our practice, we have found that while sometimes prescription medication is the current intervention being employed, it is often possible to deduce the underlying triggering factors through careful history taking and appropriate testing. Each child is assessed individually for structural integrity, nutritional factors, detoxification and genetic predispositions which indicate therapeutic doses of nutrients, amino acids therapy, or diet changes. Tics, irritability, insomnia, anxiety, depression and low mood, as well as physical ailments such as chronic diarrhea or constipation, asthma, and other chronic diseases have completely vanished with this process of correcting subluxation,



This young man has Huntington’s disease which affects his mood and sleep so profoundly that he has severe anxiety and paranoid delusions. With the care he received at our office from the pediatric chiropractor, myself and the recreational therapist, he started laughing in May of this year, and also started school in the Spring. His life has been dramatically changed. (Picture used with permission)

promoting a balanced nervous system (especially normalizing the autonomic nervous system through adjustments, vestibular stimulation, deep pressure, etc), eliminating the triggers and supporting the system with individualized clinical nutrition.

It is important to recognize that children with special needs may also have very different therapeutic requirements than children who are not challenged. Chiropractic adjustments may need to be more frequent and reinforced with specific movement protocols to promote plasticity and may require more time to integrate the changes to their structural integrity. They may also have varied nutritional requirements and an increased demand for specific supplements. Many children with sensory processing disorders, autism, ADHD, and other mental disorders have extremely limited diets, some of them self restricting to a very limited number of foods to as few as two foods in some cases (most of them non nutritive which can result in deficiencies and recurrent subluxation as a result of “toxins”). These children need support from a doctor who knows the areas where they might need more than the average child, and also how to get it into them!

A couple of examples stand out from the past few months. The first involves a young man who has cerebral palsy, and autism. This young man was being asked to stand up in his stander each day in school for a couple of hours, as part of his therapeutic program. This year

he started to complain that it hurt his legs, and he was becoming very unruly about doing it. Because of his autism, it was hard to determine why. He was being adjusted regularly to counteract the effects of his chronic spasticity and wheelchair bound lifestyle and also had been to several specialists, including our local, world renowned Shriner's Hospital. When he came to our office, one of the things tested for was vitamin D. This young man's wheel chair is black, and gets very hot in the sun, so he is kept out of it as much as possible. His vitamin D level came back so low that it indicated rickets, and by standing in the stander he was risking fracture. After a month or so of supplementation, he was able to begin to use his stander again helping to increase his bone density by weight bearing. He is also now holding his adjustments longer. This case demonstrates how knowledge of both nutrition and the special indications of different children and the demands of their lives are so important.

Another case involves a set of twin boys both with autism. Both children had self restricted their diets at one point to chips and cookies. Autistic children cannot be induced to eat by not offering other foods, they will starve themselves instead. It turns out that part of the reason these children were not eating was that they had extreme undiagnosed reflux and food allergies. Through addressing those factors, including extensive cranio sacral and spinal adjustments (both boys had plagiocephaly), myofascial release to the abdomen, and working intensively with their mother to both heal their GI systems and reintroduce foods in a planned systematic way, they have expanded their diets to include many new foods. Now if they refuse to eat, we understand that they are having a bout of GI pain, and treat it. In many other places, this would have just been considered part of "their autism." Many other symptoms of physical pain or discomfort are often written off as part of an illness, and not treated.

Another example is of a young child with Down Syndrome, who still refuses to eat solid food and lives only on smoothies. This child also suffers from constipation which sometimes ends in a painful "blowout" after several days. Working together as a team with his mother we were able to correct his lumbosacral subluxation, balance his autonomic nervous system through craniosacral technics, analyze his diet within the context of his Down Syndrome and the extra nutritional needs that he needed for his optimal health, and figure out how to get all that into his smoothies, and treat the constipation as well. He is now thriving!

The bottom line is, more and more children require

this kind of attention. We can't even begin to fathom the rising tide of children whose lives have been compromised in so many ways. I have the advantage of working in a clinic where we can see miracles occur every day, and the honor of working with the most unbelievably brave, amazing kids and families in the world. The gifts of good health and quality of life for the children and their families are what collaboration can achieve.

I would encourage all health care professionals who care for children to collaborate with one another so that more children with special needs may be helped to a better quality of life.

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Pelvic Muscle Floor Training in a Case of Postpartum Urinary Incontinence

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ABSTRACT

Objective: To discuss the management of a postpartum patient presenting with stress urinary incontinence (SUI) symptoms.

Clinical features: A 28-year-old Caucasian female, 26 weeks pregnant (third pregnancy) presented with symptoms of SUI. Symptoms started lightly after her first pregnancy and became more serious after her second pregnancy.

Intervention and outcomes: The patient received individual session of coaching pelvic floor muscle training (PFMT) according to the “Approche posturo-respiratoire” (APOR) method. This session included abdominal breathing techniques incorporating pelvic floor muscle (PFM) and transversus abdominus (TrA) contraction, false thoracic inspiration, postural recommendations and life style recommendations. A follow-up at 6 weeks, 9,12 and 18 months postpartum revealed no more symptoms of stress urinary incontinence.

Conclusion: This case suggests that the APOR may be helpful in the conservative treatment of stress urinary incontinence in postpartum women.

Keywords: pelvic floor muscle, pelvic floor muscle training, pelvic organ prolapse, urinary incontinence, stress urinary incontinence

Introduction

Urinary incontinence (UI) is a common condition seen in the general population and more frequently in the postpartum period. According to the 4th International Consultation on Incontinence, most studies reported a prevalence of ‘any’ UI in the range of 25% to 45% in the general population.¹ The prevalence during pregnancy varies widely in the literature, between 6% and 67%, and from 3% to 38%, two to three months after delivery.²

In order to be treated adequately, the type of UI must be clearly identified. Stress urinary incontinence (SUI) is described as involuntary urine leakage with effort or physical exertion, or upon sneezing or coughing. It is likely to be due to anatomical defect in the structure that supports the bladder and urethra or dysfunction of the neuromuscular component that helps control urethral pressure, or both. Urge urinary incontinence (UUI) is described as involuntary leakage accompanied by or immediately preceded by urgency usually due to a contraction of the detrusor muscle. Mixed urinary incontinence (MUI) is described as signs of both SUI and UUI.¹⁻⁴ Of these types, SUI is most commonly associated with pregnancy and the postpartum period.² Risk factors in this period of life include age, pregnancy, parity and obstetrical factors.³ The 4th international Consultation on Incontinence, recommends systematic as-

essment for pelvic organ prolapse (POP) when in presence of ‘complicated’ UI.⁴ POP is defined as the symptomatic descent of one or more of: the anterior vaginal wall, the posterior vaginal wall, and the apex of the vagina (cervix/uterus) or vault (cuff) after hysterectomy. It also includes rectal prolapse, defined as circumferential full thickness rectal protrusion beyond the anal margin.⁴⁻⁵

According to the literature, pelvic floor muscle training (PFMT) is included in the first line conservative management program for women with SUI, UUI and MUI.^{1-4,6} There is also some evidence that PFMT in women having their first baby can prevent UI in late pregnancy and postpartum.² However, the existing evidences are insufficient to make any strong recommendations about the best approach to PFMT.¹

The biological rationale for PFMT is three-fold. Firstly, effective pelvic floor muscle (PFM) contraction (lifting in a cranial and forward direction) prior to and during effort or exertion clamps the urethra and increases the urethral pressure, preventing urine leakage. However, the optimal strength to clamp the urethra and prevent urine leakage has not yet been determined. Secondly, it could also build up the structural support of the pelvis by permanently elevating the levator plate to a higher position inside the pelvis and by enhancing the hypertrophy and stiffness of its connective tissue. And thirdly, PFM may be activated with transversus abdominus (TrA) muscle contraction; this would have an implication for coordination of muscle

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activity in and around the pelvis/abdomen during everyday activity.^{2,6}

In a chiropractic practice, UI is a condition frequently seen in pregnant, postpartum women but also in the general population. In these cases, chiropractors can be a great resource for the patient. UI has a tremendous effect on the quality of life and therefore, we need to investigate closely populations at risk of developing UI. To this point, the chiropractic literature concerning UI on postpartum women is very limited. Few authors present hypothesis for further research. Hains et al. in a pilot study investigated the effect of ischemic compression over the bladder area in the treatment of UI. It was found to be an effective treatment, 69% amelioration in the experimental group versus 35% in the control group.⁷ Two retrospective case series found that chiropractic manipulation seemed to improve UI symptoms.^{8,9} High-velocity and low amplitude manipulation of the sacrum was associated with an increase of phasic perineal contraction and basal perineal tonus.¹⁰ The beneficial effects of spinal manipulation (SM) include a decrease in pain, increase in articular mobility, normalization of muscular tonus and restoration of the articular function. According to these observations, SM contributes to improved SUI symptoms.¹⁰ The anatomy and physiology of the pelvic floor and its innervations is still highly controversial, a general consensus seems to be that the sensory and motor innervation of the PFM include the pudendal nerve (nerve roots (S1), S2, S3, (S4)), and fibers from the sacral plexus.

The objective of this case study is to present another approach to prevent and manage postpartum UI. This treatment was inspired by the APOR (Approche Posturo-Respiratoire (in French) — Posturo-Respiratory Approach) created by Dr. Bernadette de Gasquet, MD. This approach combines life style recommendations on postures, breathing in order to protect the pelvic floor and the abdominal wall, and PFMT. The exercises proposed by de Gasquet are inspired by yoga postures. The APOR is especially designed for pregnant and postpartum women and can be started immediately after birth. The objective is to diminish as much as possible the effects of gravity in the first six weeks postpartum and rehabilitate the support function of the pelvic floor and the abdominals, while the support offered the abdominal wall, the uterine ligaments and the pelvic floor is diminished due to the significant stretching caused by pregnancy. The APOR contributes to the process of restoration of the pelvic floor strength and to establishing better coordination in the contraction of the PFM.¹¹ As this patient was referred for a special consult in regard to

this problem, the evaluation and management are strictly related to the UI condition. She has consulted a chiropractor in the past, but was not under chiropractic care at the time of the consult.

Case report

A 28-year-old Caucasian female, 26 weeks pregnant (third pregnancy) presented with symptoms of SUI. Symptoms started lightly after her first pregnancy and became more serious after her second pregnancy.

History

Before being pregnant and during her first pregnancy, the patient presented no symptoms of UI. She was 25 years old when she delivered her first baby. She had a normal pregnancy, gained 60 pounds and had a lot of swelling in the lower limbs during the last trimester. At 39 weeks, she delivered vaginally, without epidural, the labor lasted 6 hours including a pushing phase of 1 hour. She experienced a high level of pain due to the occiput posterior presentation of the fetus. She was in movement during the active phase of labor and lying on her back for the pushing phase. She was dilated at 9½ cm when she started pushing. She had a grade 2 pelvic floor tear and had coccyx pain for a year following birth. In 2 to 3 weeks she went back to her normal daily routine and started running for the first time of her life, 3 months after birth. She discontinued 2 months later because of generalized pain. A few months after birth, she noticed that she needed to contract her PFM in order to prevent urine leakage when she was sneezing or coughing. She also felt that her vagina wall was more distended than before pregnancy. She lost 30 pounds before her second pregnancy.

At age 28, she delivered for the second time. She had less swelling than in her previous pregnancy and gained 30 pounds. She was induced, at 41 weeks and 3 days, after 12 hours of unproductive labor, with oxytocin and by artificial rupture of the membranes. She delivered 2 hours later, with a pushing phase of 10 minutes. Her pelvic floor was intact. Within a week she went back to her normal daily routine. She had a lot of energy and her activities included lifting heavy objects and doing demanding chores. In the following months, her symptoms of SUI were more present and she now had daily leakage of urine when coughing, sneezing, laughing and on effort. She felt her vagina more distended and could feel a mass bulging in her vagina when she was constipated or when the rectum was full. She mentioned that it seriously affected her sex life. Her medical doctor diagnosed her with mild SUI and weak vaginal wall, and recommended she perform daily Kegel exercises. No fol-

low up was made with her medical doctor. She practiced the Kegel exercises sporadically. She became pregnant 9 months after her delivery.

At the time of the consult the patient was 26 weeks pregnant and still showed symptoms of SUI. The evaluation on the severity and type of UI was determined by the symptoms reported by the patient. No measures were taken to determine the amount of urine leakage. According to this, mild SUI could be assumed. The level of impact of UI on her quality of life was evaluated by the Incontinence Impact Questionnaire (*Figure 1*).

Evaluation

The patient's posture showed anterior translation of head and shoulders, and hyperlordosis. She could contract her PFM rapidly and superficially but could not hold it more than a few seconds. The pubo-rectalis contracted at the level of the rectum, slightly at the vaginal level and no contraction at the urethral level. No instrumentation was used to evaluate her PFM function. Because of her pregnancy, it was difficult to assess the abdominal muscle function. A diastasis of 1½ cm of the rectus abdominus was present. She had a score of 8/9 on the evaluation of hyperlaxity on the Brighton scale.

Intervention

The patient received individual sessions of coaching PFMT according to the APOR method. This session included:

- Abdominal breathing technique incorporating PFM and TrA contraction
- False thoracic inspiration (diaphragmatic aspiration after complete expiration)
- Postural recommendations
- Life style recommendations

Abdominal breathing technique incorporating PFM and TrA

This exercise is performed in 2 steps and in any position, as long as the posture brings the spine to neutral.

- During expiration: contraction of the PFM, followed by a contraction of the TrA (starting at the inferior margin and continue the contraction in an upward direction).
- Slowly releasing the PFM and TrA contractions and inhale slowly letting the abdomen rise while the dia-

phragm goes down (the movement of the abdomen in inspiration is passive).

It is important to verify if the contraction of the PFM is made to the full extent of the pubo-rectal muscle (from the anal portion to the urethra). Neither the expiration nor the inspiration should be forced. A forced expiration tends to bring the thoracic spine in flexion and diminish the movement of the diaphragm during inspiration.

This exercise is meant to protect the PFM and the TrA in case of raised intra-abdominal pressure. It is recommended to be used during such efforts as lifting a chair, going up stairs, getting up from a chair or a bed, carrying a baby or when using a baby carrier. It can also be used during resting as a breathing technique, helping to restore tonus in the PFM and TrA and improving oxygenation and relaxation.

False thoracic inspiration

This exercise is performed supine, knees flexed, cervical spine in neutral position, chin slightly tucked in, and with retroversion of the pelvis in order to avoid hyperlordosis. The exercise is performed in four steps:

- During expiration: contraction of the PFM, followed by a contraction of the TrA (starting at the inferior margin and continuing the contraction in an upward direction).
- Diaphragmatic aspiration: a movement that brings the abdominal wall to the lumbar spine (posterior and superior movement of the abdominal wall), which leads to a superior displacement of the respiratory diaphragm.
- Hold for a few seconds (as long as comfortable, and hold it gradually for a longer period of time).
- Slowly release the PFM and TrA contractions and inhale slowly.

It is recommended that the regimen begin as soon as the patient feels ready after birth, and that there is no pain associated with all the movements implicated in this exercise. The frequency is progressive according to the capacity of the patient. She can start by a few false thoracic inspiration at least 3 times/day, and move up gradually to 5 to 10 repetitions, 3 times daily, for the first 6 weeks after delivery. It is also recommended after each prolonged standing up period.

This exercise is contraindicated in the presence of cardiac and respiratory pathologies, hypertension, glaucoma, hernia and if pain is associated with its execution.

Figure 1. Incontinence Impact Questionnaire

<i>Incontinence Impact Questionnaire</i>				
Has urine leakage affected your:	Not at all	Slightly	Moderately	Greatly
1. Ability to perform household chores (cooking, housecleaning, laundry).		■		
2. Physical recreation such as walking, swimming or other exercises.			■	
3. Entertainment activities (attend movies, concerts, etc.).	■			
4. Ability to travel by car or bus more than 30 minutes from home.		■		
5. Participation in social activities outside your house.		■		
6. Emotional health (nervousness, depression, etc.).		■		
7. Feeling frustrated.				■
<i>Urogenital Distress Inventory</i>				
Do you experience, and if so, how much are you bothered by:	Not at all	Slightly	Moderately	Greatly
1. Frequent urination.		■		
2. Urine leakage related to the feeling of urgency.			■	
3. Urine leakage related to physical activity, coughing, or sneezing.			■	
4. Small amounts of urine leakage drops.			■	
5. Difficulty emptying your bladder.	■			
6. Pain or discomfort in the lower abdominal or genital area.	■			

Postural recommendations

When standing up, the patient is advised to do a slight retroversion of the pelvis to keep the spine in a neutral position and avoid hyperlordosis. The abdominal breathing

can be added to this posture. When seated, the patient is advised to keep the spine in a neutral position and avoid retroversion of the pelvis with spine flexed. This tends to raise intra-abdominal pressure and applies more pressure on the PFM and on the abdominal wall.

Life style recommendations

The first days and weeks after delivery are crucial in this process. The abdomen is suddenly empty. The abdominal wall is still stretched, the uterus as not involuted completely and the ligaments that hold the uterus into the abdominal cavity are still stretched from the pregnancy. In order to help the natural process of involution, it is essential to avoid pushing down the content of the abdominal cavity (intestines, uterus, bladder), as it is not fully supported yet.

- Avoid effects of gravity. The patient must avoid as much as possible standing up for a long periods of time. Also, the patient must avoid carrying heavy weights. If she feels a pressure in the lower abdomen or on the pelvic floor, or if she feels the need to hold her abdomen, it is time to rest and lay down. It is also recommended she perform the false thoracic inspiration at this stage. During the first 6 weeks, the patient must lie down and rest as much as possible (when breastfeeding, talking on the phone, playing with older kids).
- Avoid constipation
- Manage daily activities. If the patient has to lift any weight, it should be done on expiration while contracting the PFM and the TrA (abdominal breathing). Avoid movements involving the rectus abdominus, in order to avoid worsening the diastasis (if present) or creating one. Use the baby carrier, properly fixed, to hold the baby for a long period of time and do the abdominal breathing. It helps to avoid a hyperlordotic posture, which brings the abdomen forward and stretches the abdominal wall and/or pushes down on the abdominal and pelvic organs.

The patient was advised to use the abdominal breathing technique and the postural recommendations while pregnant. The false thoracic inspiration was explained, but she could not do it efficiently due to the actual pregnancy. It induced painless uterine contraction. At the end of the consult, she was able to correctly perform voluntary PFM contraction (superficial and deep PFM contraction). She also received anatomical and physiological explanations about the PFM, the TrA and the abdominal muscles and the changes the uterus goes through from pregnancy until the postpartum period.

Outcomes

The patient delivered at 39 weeks. An emergency C-section was necessary. The baby had turned breech during labor and presented signs of fetal distress. The first 24 hours were extremely painful due to the surgery and in postpartum

painful uterine contraction. She was advised to simply try to breathe deeply and gently let her abdomen move when breathing and start the false thoracic inspiration when she felt ready. She started the false thoracic inspiration the second day, once or twice daily for the next two days, then she started to follow the complete protocol. At first, 3 repetitions/series was all she could achieve, but she increased to 6 to 10 repetitions/series within the next week. For the next 4 weeks, she did 6 series of 6 to 10 false thoracic inspiration daily and did a few more each time she lay down. During the 6th week, she diminished the frequency slowly. By the end of the 6th week, she discontinued regular practice of this exercise. For the first 6 weeks after delivery, she strictly followed the postural and life style recommendations, and used the abdominal breathing.

The outcomes measured to assess the success of the case were the symptomatic resolution of UI reported by the patient and the Incontinence Impact Questionnaire (*Figure 1*). No other assessment tools were involved in this case.

A follow-up was made 3 months after giving birth. The patient had no more SUI symptoms, no more rectal prolapse in her vagina and she felt her vagina wall even firmer than before her first delivery. She mentioned that her sex life was back to normal and admitted that she had more sensations during orgasm than before her first pregnancy. According to the patient, she could efficiently perform PFM contraction and hold it for more than 10 seconds. She reported experiencing no adverse effects. She also reported being very satisfied with the results and discontinued the false thoracic inspiration mostly because of a lack of time, but continues to use the abdominal breathing technique on effort.

The patient was followed up at 9, 12 and 18 months and the improvement was persistent. Besides the consultation and the follow-up, all the supervision was accomplished by phone due to the distance between the patient's home and the practitioner's office. She performed the exercises at home without direct professional supervision.

Discussion

According to the existing literature, PFMT is recommended to be included in the first-line management programs for women with stress, urge or mixed urinary incontinence,^{1-4,6} but evidences are insufficient to make strong recommendations about the best approaches to PFMT.¹ The APOR is not included in the scientific literature but

similar approaches have been the subject of a few studies like the hypopressive technique proposed by Caufriez and the Sapsford's method.¹²⁻¹⁴

Is strength or coordination of the PFM the most important factor in order to treat UI? Regardless of the PFMT techniques used, it seems that the PFM strength is not always related to success of the treatment of UI.^{1,5,12} This suggests that a change in the PFM function is not necessarily the only explanation for the effect of PFMT. It is also possible that other aspects such as coordination of the PFM during a sneeze, cough or on exertion might contribute to the treatment of UI.

In this case the hypothesis supporting the APOR is to diminish as much as possible the effects of gravity in the first 6 weeks postpartum and slowly rehabilitate the support function of the pelvic floor and the abdominals. If the organs are frequently lifted by the false thoracic inspiration and if the mother rests as much as possible, and protects her PFM by abdominal breathing, it will prevent the organs being pushed down while they have no support and in the long term, enhance the natural process of involution and prevent UI from occurring or treat existing UI or POP.¹¹

According to de Gasquet, besides tractioning the uterus and the bladder upon diaphragmatic aspiration, the false thoracic inspiration has many other effects on the system. As it massages the abdominal and pelvic content, it could stimulate uterine contraction, intestinal transit, blood circulation, lymphatic circulation, also massaging the liver and the spleen.¹¹ And, as in the hypopressive technique proposed by Caufriez, the diaphragmatic aspiration would lead to a reflex contraction of the abdominal wall and the pelvic floor.¹² However, no study actually confirms this affirmation.

The abdominal breathing combines a PFM contraction combined with a TrA contraction. The PFM contraction would mostly protect the pelvic floor and slowly rebuild muscle strength. The TrA contraction would protect the abdominal content from being pushed forward and downward. However, some authors are concerned that abdominal muscle contraction may increase intra-abdominal pressure and hence, negatively impact the PFM. They also found that a downward movement of the levator plate during a TrA contraction in 30% of the participants.¹⁵ This implies that women should be closely monitored when doing PFMT, especially with contraction of TrA, before starting a program.

The success of this case in such a short period might also be due to the important resting period during the first 6 weeks and the fact that the exercises were during the critical period of the involution of the tissues. That could explain the persistent changes even though the period of PFMT was short.^{2,5} Another possible reason could be the contraction of the pelvic floor itself during the exercises regardless of the diaphragmatic aspiration.

Could the C-section have been a benefit for the continence status of the patient? Vaginal delivery is associated with decrease in PFM strength and endurance after delivery when compared to elective C-section and emergency c-section.¹⁶⁻¹⁸ As the SUI condition was present prior to delivery, the C-section could have protected from further damage to an already weak pelvic floor and offer the recovery time needed to protect the PFM and the abdominals.

Besides the exercises, in order to identify at risk candidate and/or candidate who already has UI symptoms but does not mention it, is the history of the patient. Risk factors include age, pregnancy, parity, obstetrical factors, menopause and reproductive hormones, hysterectomy, obesity, lower urinary tract symptoms, functional impairment, cognitive impairment, smoking, family history and genetics.³ In this case, many factors may have predisposed to the SUI:

- Long pushing phase in lithotomic position.
- Pushing when dilated at 9-1/2 cm might have stretched the PFM for a long time and put too much pressure on the PFM and the bladder.
- A rapid pushing phase in the second pregnancy could have stretched the PFM very rapidly and the muscles did not have time to accommodate.
- The PFM tear might have weakened the PFM.
- The coccyx pain might have been an indicator of biomechanical dysfunction of the coccyx, thereby altering the proper function of the PFM.
- Running shortly after birth, unless she was used to running, may have put too stress on the unsupported abdominal and pelvic structures and induced SUI.
- Hyperlaxity could also be a risk factor, which indicates that the abdominal and pelvic content have poor ligament support.
- The period of time between pregnancies is also an important factor to consider.

A variety of hypotheses suggest why PFMT done during pregnancy might help prevent UI.² On the other hand, some obstetricians and midwives seem to believe that antenatal PFMT is associated with adverse delivery outcomes such as prolonged second-stage labor, assisted or C-section delivery, episiotomy and perineal tear. This could be due to incorrect training such as overwork of the pelvic floor or, asymmetrical contractions.

From a chiropractic point of view, many other interventions could be considered in the management of a postpartum patient presenting SUI symptoms. Firstly, chiropractic adjustments could restore normal neurologic function, thereby increasing phasic perineal contraction and basal perineal tonus.¹⁰ It could also restore proper sacroiliac and pubic symphysis mobility in order to help symmetrically recruit the PFM muscle. This could avoid an asymmetrical tension applied by the PFM on the pelvic ring and thereby reinforce the mobility problem and enhance postural problems. Soft tissue technique, such as myofascial release, could also contribute to the relaxation of the PFM in cases of previous trauma of the PFM, pregnancy or birth induced tensions, avoiding again an asymmetrical strengthening of the PFM and overworking an injured muscle. In postpartum women, the PFM has been recently physiologically overstretched by the passage of the baby or by instrumentation, so it is important to allow the body time to recover after a delivery. As mentioned previously, the presence of trigger points over the bladder area could be assessed.⁷

Delivery and postpartum period are complex physiological events in the women's body. It also comes with a lot of emotional, psychological and physical changes and the practitioner needs to consider all this when treating a new mother.

Conclusion

Urinary incontinence is a frequent condition observed in the pregnant and postpartum population. Chiropractors should keep in mind the risk factors and understand the important role they have in the management of UI. The number of studies on the PFM in the postpartum population experiencing UI is very limited. Most studies included women more than 3 months postpartum and evaluate the PFM function according to its strength. Long term effect of protective exercises in the first 6 weeks after delivery is worthy of further investigation. There is also a need for large and rigorous RCT on the coordination effect of PFM in the treatment of UI. The specific effect

of chiropractic care on SUI postpartum patient is also of great interest.

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A Narrative Review and Case Report: Frenotomy Procedure in Neonate with Tongue-Tie

Valérie Lavigne, DC, IBCLC

ABSTRACT

Objective: The objective of this report is to present the case of a neonate who presented to a chiropractor with a tongue-tie causing breastfeeding difficulties as well as evaluate the evidence for the frenotomy procedure.

Design: Case report

Clinical Features: A mother presented to the clinic for breastfeeding difficulties. Upon examination, the three-week-old neonate had clear signs of tongue-tie. The mother also had cracked and bleeding nipples associated with a poor latch caused by tongue-tie.

Intervention and outcome: After evaluation of the case, a frenotomy procedure was suggested to improve tongue function and reduce the breastfeeding difficulties and nipple injury. Following the frenotomy, the pain decreased substantially on latch-on and during the feed. The nipples began to heal as well.

Conclusions: It is becoming more common for neonates with biomechanical dysfunctions affecting breastfeeding to present to a chiropractor. This biomechanical dysfunction along with congenital limitations should be explored to solve breastfeeding issues. This case suggests that the frenotomy procedure can help breastfeeding difficulties linked to tongue-tie. Considering the evidence published in the literature on the effectiveness of frenotomy with very few complications, it is the author's view that patients experiencing breastfeeding difficulties caused by tongue-tie should consider the procedure.

Keywords: neonate, breastfeeding, tongue-tie, frenotomy, chiropractic

Introduction

Mothers around the globe are encouraged to breastfeed according to the recommendations of the World Health Organization that stipulate that infants should be exclusively breastfed for at least the first 6 months of their lives.¹ However, for some mothers this guideline may be difficult to follow when they experience challenges. Mothers with breastfeeding difficulties often present to a chiropractor for an assessment of biomechanical dysfunction interfering with breastfeeding.² During the assessment of the breastfeeding case, the mouth and tongue motion should be evaluated to determine the presence of tongue-tie.³ The International Affiliation of Tongue-Tie Professionals defines tongue-tie as "an embryological remnant of tissue in the midline between the undersurface of the tongue and the floor of the mouth that restricts normal tongue movement."⁴ The tongue-tie's effect on breastfeeding has been associated with sore nipples, poor infant weight gain, neonatal dehydration and shorter breastfeeding duration.⁵⁻⁷ Considering the controversy amongst professionals regarding the frenotomy procedure, a treatment option for tongue-tie (ankyloglossia), this case report and review of the literature

will help determine the necessity of the procedure.^{5,8,9}

Clinical Presentation

A 28-year-old primiparous mother with breastfeeding difficulties presented to the chiropractic clinic. The mother had a vaginal birth at 39 weeks with an epidural injection for pain control. Birth weight of the neonate was 7 pounds 1 ounce. From the first feed, the mother experienced pain and discomfort. The hospital nurse assisted to improve the latch without success. At initial latch-on, the pain was rated by the mother as a 7/10 and went down to 4/10 during the feed. The discharge weight of the baby was 6 pounds 3 ounces, which was approximately equal to a loss of 9% of the neonate's birth weight.

Once home, there was minimal improvement of the latch. Both nipples had started bleeding and cracking. The initial latch-on pain was rated at 7/10 but it reduced to 3/10 as the feed progressed. The mother was nursing 8-10 times per day with no supplementation. The neonate was voiding 6-8 times per day and had 4 stools of yellow color and mustardy texture. The mother contacted her chiropractor who was also an International Board Certified Lactation Consultant (IBCLC) for evaluation and lactation support.

Upon examination, the three-week-old neonate seemed alert and well. The current weight was 7 pounds 3 ounces. He had regained his birth weight and had been

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gaining on average 0.5 ounces per day since birth. Weight gain should be 15-30 gm/day or 0.5 ounces-1.05 ounces per/day. According to the WHO, a fully breastfed girl gains an average of 1,000 grams in the first month, 900 grams in the second month, 700 grams in the third month, and 600 grams in the fourth month of life. A fully breast-fed boy gains an average of 1,200 grams in the first month of life, 1,100 grams in the second month, 800 grams in the third month, and 600 grams in the fourth month.¹⁰

The musculoskeletal assessment revealed restrictions in the mandibular excursion, hypertonicity in the scalenes, sternocleidomastoid, temporalis and masseter muscles. Evaluation of the cranial and vertebral motion using motion palpation and craniosacral technique showed cervical dysfunction at C1 and dysfunction of the parietal, frontal and temporal bones. The mouth and tongue examination revealed the presence of a short, thin lingual frenulum that was attached to the lower ridge of the gum line. Tongue motion was restricted in three planes, elevation and lateral motion were reduced and extension could not reach past the lower gum line. When lifting the tongue, the heart shape associated with a tight anterior frenulum was visible.

The chiropractor, IBCLC assessed the sucking and could feel the lower gum hitting her finger with reduced cupping of the tongue. To evaluate the tongue-tie, the doctor used the Hazelbaker Assessment Tool for Lingual Frenulum Function (HATLFF) and the Frenotomy Decision Rule for Breastfeeding Infant (FDRBI). The HATLFF function score was 6/14 and the appearance score was 3/10. Many components of the FDRBI tool were positive for the mother-baby dyad. An examination of the mother's nipples revealed bilateral cracks at the base. Following visual examination, the baby was put to breast to assess feeding. Even after latch adjustments, craniosacral treatment and soft tissue therapy, the pain did not decrease. The baby continued to receive craniosacral therapy and chiropractic treatment to the problematic area, but the mother was informed as well that a frenotomy procedure could potentially decrease the pain.^{11,12} To help the mother understand the procedure and make a decision, the question to be answered was does a frenotomy alleviate breastfeeding difficulties in a neonate with tongue-tie?

Literature Review

Method

The starting point for an evidence-based search was the Cochrane Library. The decision was made to start with the terms of the question. The database search was executed with "tongue-tie" and resulted in two randomized

control trials.^{13,14} Searching the database using "ankyloglossia" produced one methodological review,⁹ six trials and one technology assessment from the National Institute for Health and Clinical Excellence.¹⁵ Three of the trials were abstracts only and one was not retained because it used different treatments.^{5,16} Searching with "frenotomy" revealed nothing new.

Another database search using PubMed was done by combining the previous terms with "breastfeeding" using the Boolean operator "and". A first search with "ankyloglossia and breastfeeding" produced 42 papers. Limits of "randomized control trials (RCT), practice guidelines and review" were added which resulted in 9 papers. Most had already been found.¹⁷ A second search with the same limits was performed with "tongue-tie and breastfeeding" and resulted in 15 papers. A third search using the MeSH terms "lingual frenum/abnormalities and lingual frenum/surgery" produced 107 articles. The same limits as earlier resulted in 17 papers most of which were previously found. To assess the risk of complications of the procedure, the PubMed search was performed using the terms "frenotomy and complications". No new articles were retrieved except for a new case series.¹⁸

Results

The search revealed that only a small number of studies such as randomized controlled trials (RCT) and systematic reviews were available. However, even with a small number of studies, the National Institute for Clinical Excellence established the first guidelines in December 2005 and reviewed them in February 2011 without much change. The specialists that wrote these guidelines came from various health fields. The inclusion criteria for studies were well defined. When the guidelines were written only one RCT¹⁴ was available and a few case series.¹⁹⁻²¹ The revised guidelines state that "current evidence suggests that there are no major safety concerns about division of ankyloglossia (tongue-tie) and limited evidence suggests that this procedure can improve breastfeeding. This evidence is adequate to support the use of the procedure provided that normal arrangements are in place for consent, audit and clinical governance."²² The guidelines mention that frenotomy should be performed by registered healthcare professionals who are properly trained and that there is a need for further controlled trials on the long-term effect on breastfeeding. They also state "there were conflicting opinions among the Specialist Advisors and some stated that it is difficult to be certain whether any perceived improvement in breastfeeding is due to division of the tongue-tie." One would assume that this conflict was not strong enough to affect the guidelines recommendations.

Berry et al. (2012) produced a double-blind randomized controlled trial on tongue-tie division in Southampton, UK. The aim of this study was to see if maternally reported improvement in breastfeeding after the tongue tie division was due to the placebo effect. They had 66 babies from 5-115 days old. They were randomized to a division group and a non-division group. The mother and trained observer were blinded. The results showed an immediate improvement in feeding in 78% of mothers in the division group compared to 47% in the non-division group. This study was very well performed however one weakness to note is that they did not grade the tongue-tie. It was therefore difficult to know if these babies had anterior or posterior tongue-tie.

Buryk et al. (2011) produced another randomized single-blinded trial. Newborns with significant ankyloglossia and problems breastfeeding were followed over a 12-month period. Fifty-eight newborns were divided into two groups: 30 infants in the frenotomy group and 28 in the sham group. The diagnostic tool for ankyloglossia used was the HALTFF. Other parameters such as the nipple pain scale and the Infant Breastfeeding Assessment Tool were used. They followed up at 2 weeks and regularly over a one year period. Both groups showed statistically significant decreases of pain scores after the intervention but the frenotomy group improved significantly more than the sham group ($p < 0.001$). Breastfeeding scores improved significantly in the frenotomy group ($p = .029$). This appears to be a well executed RCT however, with a small sample size. The authors decided to quantify the nipple pain and the breastfeeding capacity of the newborn which adds value to this study. One major issue with tongue-tie remains identifying which tongue-tie require frenotomy. This study used the HALTFF tool since it is the only validated and reliable screening tool that considers function and appearance of the tongue in babies under 6 months.^{23,24} The HALTFF tool can be used to determine tongue-tied neonate regardless of the feeding method. However, when working in a breastfeeding clinic where the focus is solely on breastfeeding considering the maternal signs and symptoms are very important factors when deciding to do the frenotomy. In the breastfeeding relationship, one needs to look at the dyad i.e. mother and baby. Since the HALTFF tool does not include the mother's complaint or integrity of her nipple to determine if the frenotomy is needed, it would be helpful in a breastfeeding situation to add another tool when determining the need for the frenotomy. Such a tool (FDNR) has been developed to help identify anterior tongue-tie however it has not been validated.²⁵ This tool was also used in a prospective uncontrolled study and it incorporates both the appearance

and function of the tongue and the maternal signs and symptoms. Combining these two tools may help emphasize when the frenotomy is necessary for breastfeeding mothers if the HALTFF score is borderline but the mother is experiencing much pain.

In the aforementioned study's discussion, the authors also reviewed the weaknesses, limitations and biases. An important bias was that mothers were motivated to breastfeed. One weakness involved the blinding process. The mothers were asked not to look in their baby's mouth after the procedure and this is very hard to control. Also, all the patients in the control group were offered the procedure at the two-week mark and all but one mother opted for the frenotomy. This eliminated any possibility for more comparison between the groups. This study did not help the practitioner determine what the best timing was to perform the frenotomy but, overall a well-designed study that showed that breastfeeding mothers whose baby were struggling could be helped by a simple frenotomy.

Dollberg et al. (2006) produced a randomized, prospective study that looked at 25 infants with ankyloglossia and mothers with nipple pain. It found "after frenotomy, there was an immediate and significant nipple pain relief as judged by a significant decrease in pain score after frenotomy then after sham"⁵ The trial was blinded and randomized in two sequences: 1) frenotomy followed by breastfeeding followed by sham followed by breastfeeding and 2) sham followed by breastfeeding followed by frenotomy followed by breastfeeding. Throughout the entire process, the authors ensured that the mother was blinded to the frenotomy procedure by having an investigator present during breastfeeding following the procedure. This made sure she did not look in the baby's mouth. The study did not use a validated tool for the identification of the tongue-tie but used a more subjective tool. This would make it difficult for a practitioner in the field to identify which tongue-tie would need frenotomy. Despite its small sample size, the frenotomy procedure had positive results.

The Hogan et al. (2005) study was used in the formulation of the National Institute for Health in Clinical Excellence (NICE) guidelines. The study included 57 babies with tongue-tie of which 40 were breastfed and 17 were bottle-fed. After 4 weeks of normal monitoring, if feeding problems emerged possibly due to a tongue-tie, they were sent for a thorough assessment. They were randomized into two groups: one that offered intensive support, advice and support from the IBCLC (control) and one that had an immediate frenotomy. There were 28 children (20 breastfed

and 8 bottle-fed) in the frenotomy group and 29 children in the control (20 breastfed, 9 bottle-fed). The improvement at 48 hours for the frenotomy group was statistically significant with 27/28 children improving in the division group versus 1/29 in the control group. In the breastfed baby group, 19/20 babies improved with frenotomy whereas only 1/20 improved without frenotomy, a statistically significant difference. All the remaining mothers in the control group, all requested tongue-tie division after the 48 hours of intensive lactation support and 27/28 babies improved. The overall improvement with feeding after frenotomy was 54/57 (95% of infants). This study showed that tongue-tie may also have an impact on either breastfeeding or bottle feeding. The randomization process was well explained. They found that there was no association between tongue-tie length and feeding difficulty meaning that by looking only at the tongue-tie, they could not predict which one was causing breastfeeding difficulties as some babies with 100% tongue-tie were breastfeeding asymptotically. One major weakness involves the identification process of tongue tie where clinical inspection was used. Even with a small number of subjects, it was still able to show statistical significance. It did not use however any quantification method to assess feeding pain. This being one of the first randomized trials, it was a good foundation for future researchers to improve upon.

Steehler et al. (2012) produced a retrospective review of frenotomy in infants with breastfeeding difficulties. This cohort study and retrospective review was done by gathering data and then following up with a telephone survey. The results showed that 367 neonatal and infant consultations were performed for feeding difficulties and 307 infants underwent a frenotomy and 91 mothers participated in the follow up telephone survey. It showed that 80.4% of the mothers believed that the procedure strongly benefited their child's ability to breastfeed, and 82.9% of the mothers were able to initiate or resume breastfeeding after the procedure. A very interesting result is that they showed more benefits when the procedure was done in the first week of life of the infant. This would be interesting to follow up upon to assess what is the best timing to perform the procedure. One weakness of retrospective study is always the recall bias that cannot be removed however an interesting study that looks at the timing of the procedure.

The Cochrane search resulted in a methodological review which was a clear and concise review of the literature on ankyloglossia/tongue-tie⁹ The aim of the study was clearly defined. The database sources were identified and synthesis of the studies well explained. All the articles were

analyzed by two of the authors independently and reached a consensus on the results. Their results showed that a diagnostic criteria is needed to allow better comparison between studies. It also showed that frenotomy is likely an effective treatment but more trials are necessary and that a reliable frenotomy decision rule is needed.

Another well executed literature review by Suter and Bornstein (2009) came to similar conclusions concerning the lack of uniform definitions and classifications. It also questioned which tongue-tie need intervention.

Regarding the risks and safety of the procedure, all the trials reported very few complications. The NICE guidelines list as potential risks: bleeding, infection, ulceration, pain, damage to the tongue and salivary glands. However, several advisors state these as very rare events. They have not been reported in any of the trials except for minor bleeding. One very small case series of only two patients though reported severe bleeding.¹⁸ The conclusion was that frenotomy should be performed by trained professionals to avoid complications. Considering that over 134 babies in the 3 previous trials showed no major complications, one could infer that if performed well, the frenotomy is a safe intervention. The parents should ensure that the professionals are well trained in the procedure before giving their consent to perform the procedure on their neonate/infant.

Interpretation of the Evidence

The evidence found on frenotomy and breastfeeding was discussed with the patient. The decision was made as follows:

- This patient had tried conservative care with an IBCLC with little improvement
- This patient was presently under care to resolve the musculoskeletal components
- Her HATLFF score indicated a need for frenotomy
- Many aspects of the FDRBI tool were present
- The NICE guidelines recommended frenotomy based on the available evidence
- Since these guidelines had come out in 2005, other RCTs had been produced with positive results
- Most of the studies except for a small case series were showing no serious complications associated with the frenotomy
- The NICE guidelines and all the studies recommended that the procedure be performed by trained professionals

Intervention and Outcomes

This mother was referred to a breastfeeding clinic where trained professionals perform the frenotomy procedure daily. The mother received her informed consent and agreed to the procedure. The baby experienced minimal bleeding and remained calm during the procedure. After the frenotomy, the baby went to the breast with a dramatic reduction in maternal pain. Over the next few weeks, the mother's pain continued to decrease and her nipple damage healed. Follow up care for the frenotomy procedure was provided by the breastfeeding clinic and the author continued to follow this neonate for the musculoskeletal problems.

Conclusion

This case showed that frenotomy, if performed by trained professionals, can improve breastfeeding and should be considered to help the mother-baby dyad. This case report demonstrates how the chiropractor can easily apply the appropriate assessment tools along with therapeutic techniques to assess, treat and recommend the appropriate consultations and or interventions for women who are experiencing breastfeeding difficulties secondary to tongue tie in their children.

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Appendix 1. Hazelbaker Assessment Tool for Lingual Frenulum Function

<p><i>Assessment Tool for Lingual Frenulum Function (ATLFF)</i></p> <p>© Alison K. Hazelbaker, PhD, IBCLC March 1, 2009</p>	<p>Mothers name: _____</p> <p>Baby's name: _____</p> <p>Baby's age: _____</p> <p>Date of assessment: _____</p>
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FUNCTION ITEMS

<p><input type="checkbox"/> Lateralization 2 – Complete 1 – Body of tongue but not tongue tip 0 – None</p>	<p><input type="checkbox"/> Cupping of tongue 2 – Entire edge, firm cup 1 – Side edges only, moderate cup 0 – Poor OR no cup</p>	<p><input type="checkbox"/> Snap back 2 – None 1 – Periodic 0 – Frequent OR with each suck</p>
<p><input type="checkbox"/> Lift of tongue 2 – Tip to mid-mouth 1 – Only edges to mid mouth 0 – Tip stays at alveolar ridge OR tip rises only to mid-mouth with jaw AND/OR mid-tongue dimples</p>	<p><input type="checkbox"/> Peristalsis (progressive contraction) 2 – Complete anterior to posterior (originates at tip) 1 – Partial: originating posterior to tip 0 – None OR Reverse peristalsis</p>	<p><input type="checkbox"/> Spread of anterior tongue 2 – Complete 1 – Moderate OR partial 0 – Little OR none</p>
<p><input type="checkbox"/> Extension of tongue 2 – Tip over lower lip 1 – Tip over lower gum only 0 – Neither of the above OR anterior or mid-tongue humps and/or dimples</p>		

APPEARANCE ITEMS

<p><input type="checkbox"/> Appearance of tongue when lifted 2 – Round OR square 1 – Slight cleft in tip apparent 0 – Heart shaped</p>	<p><input type="checkbox"/> Attachment of lingual frenulum to inferior alveolar ridge 2 – Attached to floor of mouth OR well below Ridge 1 – Attached just below ridge 0 – Attached to ridge</p>	<p><input type="checkbox"/> Attachment of lingual frenulum to tongue 2 – Posterior to tip 1 – At tip 0 – Notched OR under the mucosa at the tongue base</p>
<p><input type="checkbox"/> Length of lingual frenulum when tongue lifted 2 – More than 1 cm OR absent frenulum 1 – 1 cm 0 – Less than 1 cm</p>	<p><input type="checkbox"/> Elasticity of lingual frenulum 2 – Very elastic (excellent) 1 – Moderately elastic 0 – Little OR no elasticity</p>	

SCORING

Function Item score: _____

Appearance Item score: _____

Combined Score: _____ / _____

TREATMENT RECOMMENDATIONS BASED ON SCORING

14 = Perfect Function score regardless of Appearance Item score. Surgical treatment not recommended.
 11 = Acceptable Function score only if Appearance Item score is 10.
 <11 = Function Score indicates function impaired. Frenotomy should be considered if management fails.
 Frenotomy necessary if Appearance Item score is < 8.

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Appendix 2. Frenotomy Decision Rule for Breastfeeding Infants

Mother with nipple pain or trauma while breastfeeding

AND/OR

Inability to maintain latch

AND/OR

Poor weight gain in the infant (<15 g/d)

AND

A visible membrane anterior to the base of the tongue, which restricts tongue movement, leading to:

Inability to touch the roof of the mouth

OR

Inability to cup and examining finger

OR

Inability to protrude the tongue past the gum line

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Pre-Eclampsia and the Impact on Chiropractic Management of the Pregnant Patient.

Sharon Gordon, BAppSc(Chiro), DICCP and Sherryn Silverthorne, M Clinical Chiro, RN, RM

ABSTRACT

Up to 10% of women develop pre-eclampsia during pregnancy. It is a significant cause of mortality, responsible for 10-15% of maternal deaths. Its diagnosis is based on the presence of hypertension, with or without proteinuria and edema. As primary contact health care providers, chiropractors must be aware of the risk factors, clinical signs of pre-eclampsia, and the need to modify their management appropriately. An open internet search was conducted for current guidelines in scientific journal databases, in the diagnosis and management of pre-eclampsia. Although there is little literature outlining the role of the chiropractor in patient management, it is clear that specific history and examination procedures must be performed for appropriate co-management and referral.

Key Words: pre-eclampsia, eclampsia, toxemia, hypertension, pregnancy, chiropractic

Introduction

Pre-eclampsia (also known as toxemia of pregnancy) is one of the major causes of maternal mortality and morbidity. 10%-15% of maternal deaths are directly associated with pre-eclampsia and eclampsia.¹ Up to 10% of pregnant women develop pre-eclampsia.² The incidence of pre-eclampsia in the nulliparous woman is cited as being between 3%-7% and for the multiparous woman 1%-3%.^{1,3} This diagnosis is based on the presence of hypertension, proteinuria, with or without edema. As primary contact health care providers, chiropractors must be aware of the risk factors, clinical signs of pre-eclampsia, and the need to modify their management appropriately.

Objective

To review the diagnostic criteria, risk factors and complications of pre-eclampsia, and discuss how this may affect chiropractic management of the pregnant patient.

Methods

An open literature search of 'pre-eclampsia', 'preeclampsia', 'eclampsia', and 'toxemia of pregnancy', was conducted. In addition, these terms were combined with 'chiropractic'. Other terms entered in combination with 'chiropractic' were 'pregnancy' and 'hypertension'. The search was performed with Google, and journal databases PubMed, Medline, Proquest, Cochrane, CINAHL, Medscape, and

Index to Chiropractic Literature. Collectively, more than 20,000 articles have been published in scientific journals on 'pre-eclampsia', 'preeclampsia', 'eclampsia' and 'toxemia of pregnancy'. There were no articles found on chiropractic management of these conditions. In this paper, 29 articles were cited. Six of these were RCTs, 17 were reviews of literature, and 5 were surveys, commentary, cross-sectional studies, case studies and media publications. Inclusion was based on year of publication (2000-2012), research design (RCT and Review of literature prioritized), publication in a peer-reviewed journal, the number of citations of the given article (higher rate of citation given priority), other publications by author, and articles with unique insight into the topic.

Clinical Presentation

A diagnosis of pre-eclampsia in the pregnant patient is made in the presence of hypertension and proteinuria, with or without edema.^{4,5}

Hypertension may be considered mild to moderate (Blood pressure greater than 140/90mmHg) or severe (Blood pressure greater than 160/110mmHg). The severe form often features hemolysis, elevated liver enzymes, and low platelet count (HELLP syndrome, which occurs in approximately 5% of pre-eclamptic patients).^{5,9}

A 2011 study of 400 pregnant women, 100 hypertensive, found that mean arterial pressure was a better predictor of pre-eclampsia in the first and second trimesters of pregnancy. Third trimester was best measured by systolic and diastolic blood pressure.⁶

Proteinuria may be detected by a dipstick urinalysis. A

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protein sample of 30 mg, which is equal to $>+1$ is diagnostic. It must be found in 2 or more random urine samples, at least 4-6 hr apart, but no more than 7 days apart. Alternatively, a 24-hour urine test greater than or equal to 0.3g is positive for proteinuria.¹

Diagnosis of edema is subjective, based on observation, and manual palpation. It is usually performed at the lower extremity about the ankle, where the practitioner assesses for bilateral pitting edema, consistent with that found in pre-eclampsia.^{1,7}

A review of literature by Sibai in 2005 found that 'Other than early detection of preeclampsia, there are no reliable tests or symptoms for predicting the development of eclampsia'.⁸

The exact cause of pre-eclampsia is unknown. Placental vascular dysfunction is linked to the cascade of events and symptoms. A review of the literature suggests "alterations of placental vessels required for adequate perfusion of the placenta, which leads to ischemia. The mechanisms that link the ischemic placenta to endothelial lesions and to stimulation of vasoconstrictors and inhibition of vasodilators are still subject of speculation."⁹

Co-morbidities

Other clinical findings may be seen in the pre-eclamptic patient. These include, but are not limited to, hyper-reflexia, clonus, visual disturbances, epigastric pain, and headaches.

Onset of symptoms is usually around 20 weeks gestation with hypertension and proteinuria, with or without peripheral edema.^{5,10}

A case report in 2002 documented the case of a 28-year old woman in her 37th week of pregnancy, experiencing reversible cortical blindness due to vasogenic edema. One month postpartum, her vision returned to 20/20.¹¹

Complications

Complications for the pregnant mother include eclampsia (pre-eclampsia plus seizures, occurring every 1/250 pre-eclamptic patients),¹² rapid weight gain, DIC, nausea, vomiting, headaches, visual disturbance, hyper-reflexia, clonus, convulsions, cerebral ischemia, right upper quadrant pain or epigastric pain, HELLP syndrome.¹³

A retrospective study of 453 pre-eclamptic patients found that giving birth by cesarean section increased the

risk of complication during the post-partum period.¹³

In a critical review of the literature, Rinehart et al in 1999, found the three most common symptoms of pre-eclampsia associated hepatic haemorrhage were epigastric pain, hypertension and shock.¹⁴

For the fetus, they include death, placental insufficiency, growth restriction and premature delivery.^{7,10}

A study of 239 pregnant women by Haddad, Kayem, Deis, Sibai in 2006, found that in severe cases of pre-eclampsia and intrauterine growth restriction, risk of death was higher in the fetus, but had no impact on maternal complications.¹⁵

A pregnant patient with pre-eclampsia is considered 'high risk' due to the potential complications of gestation and delivery. For this reason, management is predominately overseen by an obstetrician and/or midwife.

Risk Factors

The following are documented risk factors for the development of pre-eclampsia in the pregnant woman: Age over 40, nulliparity or history of pre-eclampsia, family history of pre-eclampsia, diabetes, smoking, hypertension, renal disease, fetal congenital abnormality, and characteristics such as twin or molar pregnancy, autoimmune disease, antiphospholipid syndrome, longer intervals between pregnancies, high BMI (Body mass index >25), and proteinuria.^{1,3,4,16}

In a systematic review of controlled trials, Kirsten Duckitt's controlled cohort studies showed that the risk of pre-eclampsia is increased in women with a previous history of pre-eclampsia, those with antiphospholipids antibodies, pre-existing diabetes, multiple (twin) pregnancy, nulliparity, family history, raised blood pressure (diastolic ≥ 80 mm Hg) at booking, raised body mass index before or at booking or maternal age ≥ 40 . Other studies, also noted interval of 10 years or more since a previous pregnancy, autoimmune disease, renal disease, and chronic hypertension all increase the risk of developing pre-eclampsia.³

A Taiwanese hospital study confirmed that BMI >24 kg/m² increased the risk of diabetes, pre-eclampsia and pre-term labor.⁷

A multi-centre placebo-control study looked at 4,589 nulliparous women to identify pre-eclampsia risk factors, and whether it was impacted by calcium supplementation. They found raised body mass, as well as with increased

systolic and diastolic blood pressure increased the risk of pre-eclampsia. These results were independent of calcium supplementation.¹⁸

Medical Management

Medical management involves routine monitoring of blood pressure and urinalysis. Magnesium sulfate is given for severe pre-eclampsia and eclampsia. It has been shown to significantly lower the risk of eclampsia and maternal death, but no impact on fetal death.^{19,20} Antihypertensive medications are only recommended in the presence of other complicating factors. There is insufficient evidence to support the many recommended lifestyle changes (aerobic exercise, altered protein intake, Vitamin C, Vitamin E), however low-dose aspirin, calcium and fish oil supplementation have the strongest evidence.^{21,22,23}

The World Health Organization RCT on calcium supplementation for pregnant women found that it did not prevent pre-eclampsia, but did reduce severity, maternal morbidity and neonatal mortality.²⁴

In a review of the literature, Rossi & Mullen (2011) looked at vitamins C and E and low-dose aspirin supplementation for the prevention of pre-eclampsia. They found no evidence to support their role in prophylaxis.²⁵

A double blind RCT investigated fish oil supplementation for the prevention of gestational diabetes and pre-eclampsia. They found that supplementation in the first half of pregnancy had no impact on the incidence of either.²⁶

Chiropractic Management

There is little evidence documenting chiropractic management, or evidence of its impact on natural history. With commonly associated symptoms such as hypertension and diabetes, chiropractic management must be modified to accommodate the patient with pre-eclampsia and its risk factors.

Chiropractors are primary health care practitioners. Therefore, initial consult with the pregnant patient should include screening for pre-eclampsia risk factors in the health history. Examination should also include a baseline blood pressure analysis, regardless of gestation. In the presence of hypertension in a pregnant patient, the chiropractic clinician should refer for medical co-management as appropriate.

Follow-up chiropractic management may include the following:

- Regular screening for recent onset of pre-eclampsia symptoms such as edema, rapid weight gain, visual disturbances, headaches, etc. from 20 weeks gestation.
- Monthly monitoring of blood pressure, and indicators for neurological re-examination.
- Modify care using low-force chiropractic techniques, or in some cases, be aware of contraindications to cervical adjusting.
- Lifestyle advice on lowering BMI in the pre natal period, or between pregnancies
- Dietary counselling on foods appropriate for diabetes and optimal health

With the increased risk of pre-eclampsia in subsequent pregnancies it is vital for the chiropractor to work with the woman to urge a healthy lifestyle.²⁷

Discussion

In a recent review on the management of pre-eclampsia by Pettit and Brown (2012), published in the European journal of obstetrics and gynecology, it was noted that 'the extensive vascular and metabolic long-term associations with pre-eclampsia are now apparent and as clinicians we have a major responsibility to urge healthy lifestyle for these women after any pre-eclamptic pregnancy.'²⁷

A cross-sectional survey of 112 pregnant women investigated their knowledge of pre-eclampsia symptoms, consequences and actions. They concluded that women generally have a poor understanding of pre-eclampsia that improved with patient education, with the potential to reduce the risk of complications.²⁸

A prospective cohort study in 2010 looked at the accuracy of women self-reporting pre-eclampsia. This was thought to be lack of patient-doctor communication. It reinforces the need of all health practitioners to appropriately monitor and educate their patients on preeclampsia.²⁹

Conclusion

Pre-eclampsia is a significant cause of maternal mortality and morbidity. It carries known risk factors, and classic clinical symptoms, which the chiropractor must be aware of, along with their impact on management. There is extensive medical research into pre-eclampsia, but little research documented in the chiropractic literature. Further research is needed in the area of chiropractic-based

and adjunctive techniques, to determine their impact on patient outcomes.

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A Multi-Disciplinary Approach to Gluten-Induced Behavior Issues

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ABSTRACT

Objective: To discuss alleviation of autism spectrum disorders (ASD) symptoms following a multi-disciplinary approach. To suggest that observable behavior might be caused by sensory dysregulation.

Clinical Features: A 2-year-old boy with multiple sensory and behavioral issues, diagnosed only at 6 years old with attention deficit hyperactivity disorder (ADHD), presented for occupational therapy. This case provides an educational tool of useful guidelines for chiropractors to incorporate into their practice, with proper training in the modalities described below.

Intervention and Outcome: Progressive reduction in behavioral and sensory issues was observed using Craniosacral Therapy (CST), Myofascial Release (MFR), Sensory Integration (SI) and gluten elimination over a 5½ year period.

Conclusion: In this case of a child diagnosed with ADHD, benefits were observed in decreasing sensory and behavioral issues using a long term multi-disciplinary alternative approach.

Key Words: ASD, autism, ADHD, pervasive developmental disorder-not otherwise specified (PDD-NOS), occupational therapy (OT), chiropractic, craniosacral therapy, myofascial release, sensory integration.

Introduction

Autism spectrum disorders (ASD) are a group of neurodevelopmental disorders characterized by social and language deficits, stereotypic behavior and abnormalities in motor function.¹ The incidence of ASD is on the rise, recently cited at 60 per 10,000.² The numbers vary depending on climate,³ proximity to toxic sites⁴ as well as genetics.⁵ Although the traditional medical approach has been to resort to medication, research supports benefits from alternative management for children on the autistic spectrum. Elimination diets,⁶ sensory integration (SI) techniques⁷ and upper cervical manipulations⁸ have been separately suggested as contributing factors in the literature. This case describes long term progress from multi-disciplinary care impacting the structural, functional and physiological limitations of a child with sensory and behavioral issues.

Case Report

A 2-year-old Caucasian boy presented with sensory issues. Sensory integration dysfunction includes symptoms that range from distractibility, impulsiveness, motor coordination difficulties, low tolerance, and social skill problems. The patient was generally irritable and tended to get frustrated very easily (biting). Such behavior is a neurologic emotional processing deficit typical in ASD.⁹ In this particular case, there was also a safety concern as

the child's balance response was limited due to gravitational insecurity. He was therefore unable to accurately predict and rely on his innate competency to respond to gravity safely and efficiently. This limitation appears to have stemmed from gastro-intestinal distress creating a spasm along his abdomen which prevented his core flexors from developing. He also tended to look down on the ground, which made him appear to be in his own world. The author hypothesizes that this was to relax his wide-eyed gaze that was otherwise in constant vigilant mode (and high extensor tone).

His immunizations were current. His history was significant for a staphylococcal infection when he was 3 months old. He had seasonal allergies (in the warm months, relieved by Zyrtec), as well as an allergy to the antibiotic, Augmentin, resulting in a constant diaper rash. He recently had 4 ear infections in 4 months, treated each time with antibiotics. He also had a speech delay. Six months prior to the initial visit, he had consulted for an ear exam, which concluded that hearing loss "could not be ruled out."

At age 2, his parents urged his doctor that "something was not right." Hence, the doctor recommended that the patient receive services from his state's Birth to Three Program for social/emotional and developmental delays. Although his doctor never diagnosed sensory issues, almost everyone involved in the patient's care considered that this was the case. His Birth to Three Speech Therapist/Case Manager suggested he start OT for his sensory integration issues. Only once he was enrolled in 1st grade was he di-

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agnosed with ADHD and possible PDD-NOS. Although distinct diagnoses, some overlap is inherent between ASD, ADHD and PDD-NOS. Co-morbidity is also more and more prevalent in the literature.¹⁰ Both ADHD and PDD-NOS children have difficulty with appropriate social behavior, but children with PDD-NOS issues present with significantly more social, withdrawal and communication issues.¹¹ Furthermore, PDD-NOS children tend to have a higher level of functioning (for example: communication, daily living and social skills) and less repetitive stereotypical behaviors than autistic children.¹²

When first starting OT, the child's sensory issues were broad, ranging from his behavior deteriorating with any schedule change, agitated when having his hair washed, distressed when having his nails trimmed, intolerant to tags or any mess on himself, limited tolerance for swinging, yet sought opportunities to feel vibrating objects. He refused to try new foods and did not eat any fresh fruits. He had just started eating with a spoon. He also woke up 1-2 times every night, crying.

The postural exam revealed a forward head carriage, and a hypokyphosis of the thoracic spine. He toe walked during his gait. Although he moved with his head down, his head was tipped so that his right eye remained superior. His abdomen was distended. By palpation, the right lateral inferior abdominal quadrant was warm and soft, with some oedema overlay into the right groin, laterally and posterior into the lumbar region. No bowel sounds were noted during palpation. In his lower extremity, his sacrum and pelvis were immobile and his hip mobility was limited bilaterally.

A Sensory Profile was performed to better understand the patient's dysfunctions and focus of treatment for sensory integration disorder (SID). This is a questionnaire to best describe the frequency in which the child repeats certain behaviors. The results of this patient's profile indicated: "Overall sensory seeking and sensory avoiding; oral sensory sensitivity and inattention/distractibility".

Soon after the patient started his treatment, a Candida quiz was also provided for his mother to complete, as he appeared to demonstrate signs of yeast overgrowth (chronic diaper rash, allergies, irritability and limited coordination). This questionnaire derived from detailed symptoms outlined by Crook (1986)¹³ is conducted in 2 parts. Part 1 includes physical symptoms reflecting potential Candida colonization. Part 2 includes physical symptoms reflecting the intensity of the Candida overgrowth. The answers were scaled and revealed a score suggesting "Established

Candida overgrowth", and "Candida problems are a growing issue".

The patient's initial diagnoses were a thoracic sprain/strain and an abnormal gait. He was expected to improve in the following areas: 1. Increased safety with independent mobility; 2. Increased awareness of self and environment in play; 3. Increased tolerance and endurance for sensory events. By the 57th visit, the diagnosis changed to an unspecified autonomic nervous system imbalance. The patient was 5-years-old by then.

Intervention and Outcome

Each visit consisted of a half-hour or more of manual therapy. CST¹⁴ and MFR,¹⁵ were used in tandem to affect postural and fascial strain patterns, deep in the tissues and articulations. Both techniques apply a gentle sustained pressure into connective tissue restrictions that create imbalance in the system. These restrictions arise when there is an injury, or the body needs to protect itself internally. Tensions and torsions thus alter the symmetry of the fascial web that connects all tissues of the body. Compensations ensue and eventually symptoms can appear if the system does not have enough lee-way to rebalance itself.

The second half-hour of therapy was of a more functional order. Sensory integration was the therapeutic modality of choice used for this patient to help his nervous system achieve balance to perform new skills, including gross motor, fine motor and verbal competencies. This therapy is performed in a special room using novel dynamic suspended equipment specifically designed to stimulate the child's senses and promote adaptive response. Changing velocities of rotation, swinging, along with varying heights, pressures, and textures, activate cranial nerves and postural reactions by eliminating the musculoskeletal coordination gained by contact with the floor. During the session, an occupational therapist works closely with the child to engage actively by finding the "just right challenge", allowing for progression in skills through play, while the child adapts his behavior to circumstance.

The patient consulted a naturopath by age 6 and a nutritionist by age 7. Removal of all gluten from his diet was emphasized. Sources of hidden gluten were addressed. Smoothies were suggested as a way to incorporate healing foods for the digestive tract into his diet, considering his texture sensitivity. Probiotics, omega-3s and other anti-inflammatory supplements were added to his smoothy cocktail. It is postulated that probiotic therapy in the ASD population has detoxification properties.¹⁵ Furthermore,

there is evidence which suggests that fatty acid deficiencies correlate with neurodevelopmental childhood disorders.¹⁷

The patient's care has been ongoing for the past 5½ years. Initially, he was discharged following regular care 2 times a week for 6 weeks, as his symptoms had improved considerably. Seven months later, he returned once a week for 8 weeks after aggressive behavior towards peers was reported via telephone calls. He had gained height which revealed an underlying restricted cranial base and vestibular mechanism, in conjunction with the sacrum. Manual therapy techniques were not effective in reducing the aggression. He 'crashed' himself into the equipment, losing his previously demonstrated finesse. Review of his diet during this growth spurt showed he was consuming a significant quantity of gluten free treats. This was validated as a trend by review of the chart with his mother. It was at this point that he was recommended to take a break with therapy for 6 weeks to integrate the gluten detoxification diet. Soon after his return, the right lower abdominal quadrant palpated normally. This is where the cecum is located, an anatomic location that tends to be sensitive to gluten.¹⁸ However, the left superior medial abdominal quadrant palpated as spongy and warm. This area correlates with the pancreas region which is involved in dairy digestion. Thus, it was also suggested that cow dairy be eliminated for one month before continuing care. This elimination normalized tissue density over the left medial inferior sternum. The patient's behavior became more confident, less agitated and he stopped biting himself and others. Cow's milk was hence replaced with raw goat's milk. From then on, treatment need was reduced from 2 times a week to 1 time a week, and to every 2 weeks. Eventually, it further decreased to monthly and then bimonthly visits, mainly due to the parent's worry about their son's behavior excluding him from public school. When his symptoms improved again, he was to be discharged until his symptoms returned.

MFR and CST immediately provided gastrointestinal type releases such as bowel sounds, flatulence and burping. This was considered to be an autonomic nervous system response. Although initially cranial work was minimally tolerated, the frontals, temporals (i.e: the vestibular system) and occiput were eventually addressed at length. The patient soon demonstrated improved coping and adaptation so that transitions between activities were less catastrophic and eventually cooperative. Deep pressure through the muscles and joints was used as a tool to help accept touch during manual treatments, while graded swinging activated the vestibular system and helped gain presence on the ground and against gravity along with sound production,

vocalization and finally interaction. Meanwhile, MFR was applied to the lower abdominal area which allowed for increased trunk rotation. By the 13th visit, all goals had been met except for expressing himself with words while using the equipment. He was able to perform spontaneous play on low, slow vestibular apparatus and was meeting increased challenges with pleasant anticipation instead of previously experienced dread. A one month break was advised to strengthen his neurodevelopment and develop new skills. Although he returned with more cranial and lower abdominal tension patterns, by the 23rd visit, he demonstrated greater motor planning, showing timing normalcy. He also started to demonstrate caution, a key indicator of an accurate visual, vestibular and proprioceptive feedback system. This increased safety awareness while playing allowed him to expand his repertoire with increased confidence. He showed modulation in his timing and placement, using balance reactions and postural adjustments combined with skill. His functional abilities were increasing to tolerate multiple challenges and sabotage, with glee. Meanwhile, growth spurts seemed to coincide with significant increased tensions along the cranial base. In these periods, he tended to avoid the dynamic equipment during SI sessions. Palpation revealed asymmetrical temporal mobility as well as at the cranial base through C2. Treatment using manual therapy was effective in restoring normalcy, which enabled his participation in the sensory motor activities and on the equipment. He then started engaging with peers on the equipment and eventually became a role model for other children while at play. Relief from dizziness helped him gain tolerance and joy on the swings. Overall, he has shown significant improvement in balancing, following instructions, and focusing on tasks.

Hives arose while a manual release along the abdomen was being performed during the 34th visit, but resolved within 20 minutes. This was the only adverse effect noted during treatment. His mother's observation was that these hives looked like the ones he had as an infant, after the treatment of his staph infection.

Although the patient's symptoms continue to fluctuate over time, he made neurodevelopmental, social and adaptive gains overall. His parents progressively noted numerous changes. He and his family could participate in community events with predictable outcomes. He became more social, and developed a small circle of friends. He was able to sleep through the night. He became a participant in self care activities. As his outward behavior improved, so did his vocabulary. He started using new words, making short sentences and eventually learned how to spell and

read. Over the years, he developed problem solving skills, coordination, and strength. He also began to independently initiate home chores.

The patient's mother noticed that biweekly care sustained his highest level of function. She also found a correlation between deteriorating behavior and his growth spurts, followed by a "blossoming". Conversely, if too much time elapsed between sessions, he had a growth spurt, or gluten/sugar/dairy was inadvertently introduced into his diet, he tended to regress with bouts of aggression, immature language, self stimulatory spinning, idle sitting and picky eating. As he got older, hives would appear in conjunction with his poor behavior. Removal of gluten made him happier, more cooperative and attentive. An aide at school was thus provided to sit with him at lunch and ensure that he was not receiving shared gluten foods from his peers. Rhythmic joint deep pressure was also found to be helpful in slowing down his respiration rate, calming him, and reducing the intensity and frequency of his violent outbursts. Following a 4-month pause in treatment, at age 7, the patient had appendicitis and a subsequent appendectomy. The author considers this of significance as the cecum, adjacent to the appendix, tends to be affected by gluten intolerance.¹⁹

Discussion

Considering this patient's multiple sensory, attention and behavior issues, he is a likely candidate to be considered on the autistic spectrum. A gut-to-brain axis²⁰ appears likely to be at the source of his symptomatology, and leaky gut syndrome²¹ the underlying culprit. This inflammatory process was probably related to numerous antibiotic²² exposures, and accentuated long-term consumption of processed foods²³ while gluten and dairy intolerant. A genetic causality cannot be ruled-out, as his father lost at least 140lbs using the same food elimination diet. Nutritional counselling became a key component in providing long-term relief of the patient's issues. The nutritional changes not only focused on eliminating allergens, but also in providing healthy alternatives to help replenish his gut lining thus directly impacting his nervous system.

The patient continues to be gluten and dairy-free, and under care for manual therapy and SI as some symptoms remain (such as occasional bouts of aggression). His needs are lessening as his gut becomes healthier. His progress may have been more rapid had he been under consistent care regardless of symptoms. In this case, it is speculated that the patient would have been able to gain a greater level of homeostasis to provide some headway. Hence, a direction for future study could be to establish a treatment plan that

is less symptom-dependant.

Conclusion

In combination with a multi-disciplinary manual and functional approach, it is advised to first consider an elimination diet when dealing with anyone on the autistic spectrum. It is important to keep in mind that the digestive tract's health directly impacts the nervous system, thereby influencing behavior. In addition, organic food²⁴ is suggested as a potential tool to further alleviate these patients' symptoms considering pesticides²⁵ have been associated with ASD. Finally, chiropractic's broad scope allows for the possibility to incorporate sensory motor integration principles into one's practice, even while using minimal equipment, in order to provide a practical link between structure and function. Above all, the chiropractor can provide counsel to empower the parents to adapt their household and activities to best suit their child's needs.

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Energy Drinks and Adolescents — What Should Health Practitioners Know?

Sharon Gordon, BAppSc(Chiro), DICCP

ABSTRACT

Energy Drinks are readily available in supermarkets throughout the world. There are currently no restrictions or guidelines on safe consumption by children. Energy drink consumption by adolescents is on the rise, as companies continue to aggressively market their product to this demographic. It has become socially acceptable for children to consume these drinks, as there is a perception that the products are safe. In addition, they have become a popular accessory in the youth extreme-sport culture. Overall, research on adolescent energy drink consumption is lacking, however side effects similar to that seen in adults, have been reported in the adolescent population. The chiropractor must be aware of these side effects, including how they may relate to presenting symptoms, and educate their patients on the dangers of energy drink consumption.

Key Words: energy drink, caffeine, adolescent, chiropractic

Objective

To review the literature on energy drink consumption amongst adolescents, and discuss the physiological effects that may present to the chiropractic office.

Methods

Scientific journal databases were searched, including PubMed, Medline, Proquest, Cochrane, CINAHL, Medscape, and Index to Chiropractic Literature. An open internet search was also performed.

Discussion

Adolescents may present to chiropractic offices with a variety of symptoms. A survey of practitioners by Alcantara, Ohm and Kunz (2010) found chiropractors were commonly sought for help with digestive issues, ADHD, and headaches in children.¹ Ferrance and Miller (2010) cited musculoskeletal complaints, ADHD, sleep problems, asthma and sinusitis as the most common reasons for parents seeking CAM (complementary and alternative therapies) for their children.² Some of these symptoms prompting chiropractic consult may mimic, or in fact be due to side effects of increasing energy drink consumption in the adolescent population.

Energy drink consumption by adolescents is growing in popularity. They are the targets of aggressive product marketing, yet we still do not know the safe level of consumption in this population. Currently, these caffeinated

drinks are 'Legal, easy to obtain and socially acceptable to consume by adults and children'.³

The most popular energy drinks in Australia are 'V', 'Red Bull', 'Mother', and 'Monster'.⁴ Most research to date has been conducted in the form of surveys in the U.S.A, especially of first year college students. In one survey, 51% of college students regularly consumed energy drinks⁵ and another college survey found 39% of students had consumed at least one drink in the preceding month. Males were more likely to consume than females, and this was strongly associated with masculinity and risk-taking behavior.⁶

Most energy drinks contain 80-140g/250mL caffeine. This is equivalent to 1 cup of coffee, or two cans of cola. Some energy drinks of greater volume contain up to 500g of caffeine.^{7,8} In a survey of 12-18 year olds, 73% consumed greater than 100mg caffeine on a daily basis.⁹ There has been an overall 70% increase in caffeine consumption by children and adolescents worldwide in the last 30 years, and studies have shown that anywhere from 20-100% of caffeine consumers display evidence of caffeine dependence.¹⁰

There are several reasons why energy drink consumption has become so popular in the adolescent population. These include tiredness, to improve energy levels, combine consumption with alcohol, and enhance athletic and mental performance.¹¹

Some research into the benefits of energy drinks found that consumption of energy drinks did show transient improvements in concentration and alertness. An RCT shows

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that consumption can improve cognitive performance in behavioural control tasks.¹² Other studies also demonstrated marginally better sporting performance.¹³ The perceived benefits of energy drinks are widely thought to be due to the combination of caffeine and sugars, which ‘stimulates the central nervous system, alleviating fatigue, increasing wakefulness, and improving concentration and focus’.¹⁴ Interestingly, in a double-blind young adult running time trial, sugar-free Red Bull did not improve run time. This supports the theory that any benefits are gained from the combination of sugar and caffeine.¹⁵

In the U.S.A, the American Association of Poison Control Centers tracked 331 calls in January to February of 2011 reporting caffeine drink overdose. The majority involved children and teens.¹⁶ Overall, ‘Of the more than 5000 US caffeine overdoses reported in 2007, 46 per cent occurred in youths aged 18 or younger.’¹⁷

A New South Wales (Australia) poisons information line received 300 calls reporting symptoms of caffeine overdose, one-third required hospitalisation. Adolescents and children were the most commonly affected.¹⁸

Caffeine as a drug has the greatest likeness to cocaine, and symptoms of withdrawal are not dissimilar.¹⁹

Energy drinks also carry side effects that can range from transient and benign to fatal. The practice of combining energy drinks with alcohol continues to grow in popularity, giving the consumer an added ‘buzz’. The concern with combining a caffeine stimulant with alcohol is that the consumer can underestimate their level of intoxication.^{20,21} A study by Kathleen Miller (2008) found that energy drink consumption was also associated with drug use, fighting, seatbelt omission, risk-taking, smoking and drinking in the Caucasian population.²²

Other documented side effects include increased blood pressure,^{23,24} increased platelet aggregation,²⁵ dehydration,²⁶ anxiety,²⁷ cardiac arrhythmia,^{28,29,30} headaches,^{31,32} nausea,³³ sleep deprivation,^{34,35,36,37} fidgeting,^{38,39} increased pain tolerance,⁴⁰ stroke, seizure,⁴¹ bed wetting,⁴² dizziness,^{43,44} weight gain,⁴⁵ and in extreme cases, death.⁴⁶

With these symptoms as potential side effects of energy drink consumption, the chiropractic clinician must take thorough adolescent patient history to correctly determine the etiology of symptoms, educate their patient and manage them appropriately. As energy drinks are seen as socially acceptable to consume in this age group, an adolescent

chiropractic patient may not mention energy drink consumption in a standard health history.

Conclusion

Energy drink consumption is a growing trend in adolescent culture, particularly among active youths. There is no known safe consumption level of energy drinks in the adolescent population yet there are currently no restrictions on the marketing, sale or consumption of energy drinks by minors. Chiropractors should be aware of potential side effects of energy drink consumption, which may lead to clinical presentation. The education of adolescent patients on the potential dangers of energy drink consumption is also required of the chiropractic clinician. Further research is needed in this area before regulation in the sale of such drinks can be mandated.

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Abstracts of Interest

Kvitvaer BG, Miller J, Newell D. Improving our understanding of the colicky infant: a prospective observational study. *J Clin Nurs.* 2012 Jan;21(1-2):63-9. doi: 10.1111/j.1365-2702.2010.03680.x. Epub 2011 Apr 21.

AIM: To investigate characteristics differentially associated with infants suffering from colicky-crying vs. other infants.

BACKGROUND: The crying baby is the most common presentation in every clinician's office in the first 16 weeks of life. As little agreement exists in the literature, attempts to establish differential diagnosis, aetiology, incidence, risk factors and natural progression in addition to appropriate intervention guidelines are urgently needed. **DESIGN:** Prospective observational study. **SUBJECTS:** Infants \leq 12 months, 159 colicky and 27 non-colicky infants ($n = 186$) from whom complete data sets were collected. **METHODS:** Parents of infants presented to the clinic completed questionnaires of their infant's characteristics. The data were analysed using logistic regression. **RESULTS:** Symptoms supporting the diagnosis of colicky-crying infants included 'child flexes/curles legs', 'child has difficulty/discomfort on bowel movement', 'child is more irritable postfeeding', 'child is more irritable when put into cot', 'child appears in pain', 'child wants frequent cuddling', 'family allergy/asthma' and 'child changes from happy to crying in an instant'. A nomogram illustrated if a mother suggests colic as a diagnosis and the infant has the symptoms supporting the diagnosis, then the chances of being a colicky infant rise from the initial prevalence 85% to approximately 98%. If the symptoms are not present, the chances of being a colicky infant drop from 85% to around 3%. **CONCLUSION:** Because the literature lacks consensus regarding a gold standard for the diagnosis of the colicky-crying infant, these findings may offer help to the health care practitioner when faced with an excessively crying infant. **RELEVANCE TO CLINICAL PRACTICE:** It has been hypothesised that there may be multiple reasons for excessive crying in an infant. It is necessary to differentiate between the types of crying infants that present to the clinician to determine the best course of action.

Miller JE, Newell D, Bolton JE. Efficacy of chiropractic manual therapy on infant colic: a pragmatic single-blind, randomized controlled trial. *J Manipulative Physiol Ther.* 2012 Oct;35(8):600-7. doi: 10.1016/j.jmpt.2012.09.010.

OBJECTIVE: The purpose of this study was to determine the efficacy of chiropractic manual therapy for infants with

unexplained crying behavior and if there was any effect of parental reporting bias. **METHODS:** Infants with unexplained persistent crying (infant colic) were recruited between October 2007 and November 2009 at a chiropractic teaching clinic in the United Kingdom. Infants younger than 8 weeks were randomized to 1 of 3 groups: (i) infant treated, parent aware; (ii) infant treated, parent unaware; and (iii) infant not treated, parent unaware. The primary outcome was a daily crying diary completed by parents over a period of 10 days. Treatments were pragmatic, individualized to examination findings, and consisted of chiropractic manual therapy of the spine. Analysis of covariance was used to investigate differences between groups. **RESULTS:** One hundred four patients were randomized. In parents blinded to treatment allocation, using 2 or less hours of crying per day to determine a clinically significant improvement in crying time, the increased odds of improvement in treated infants compared with those not receiving treatment were statistically significant at day 8 (adjusted odds ratio [OR], 8.1; 95% confidence interval [CI], 1.4-45.0) and at day 10 (adjusted OR, 11.8; 95% CI, 2.1-68.3). The number needed to treat was 3. In contrast, the odds of improvement in treated infants were not significantly different in blinded compared with nonblinded parents (adjusted ORs, 0.7 [95% CI, 0.2-2.0] and 0.5 [95% CI, 0.1-1.6] at days 8 and 10, respectively). **CONCLUSIONS:** In this study, chiropractic manual therapy improved crying behavior in infants with colic. The findings showed that knowledge of treatment by the parent did not appear to contribute to the observed treatment effects in this study. Thus, it is unlikely that observed treatment effect is due to bias on the part of the reporting parent.

Stuber KJ, Wynd S, Weis CA. Adverse events from spinal manipulation in the pregnant and postpartum periods: a critical review of the literature. *Chiropr Man Therap.* 2012 Mar 28;20:8. doi: 10.1186/2045-709X-20-8.

BACKGROUND: The safety of spinal manipulation during pregnancy and the postpartum periods has been a matter of debate among manual therapists. Spinal manipulative therapy during these periods is a commonly performed intervention as musculoskeletal pain is common in these patients. To date there has not been an evaluation of the literature on this topic exclusively. **METHODS:** A literature search was conducted on PubMed, CINAHL and the Index to Chiropractic Literature along with reference searching for articles published in English and French in the peer-reviewed literature that documented adverse effects of spinal

manipulation during either pregnancy or postpartum. Case reports, case series, and any other clinical study designs were deemed acceptable for inclusion, as were systematic reviews. The appropriate Scottish Intercollegiate Guidelines Network (SIGN) tools were used to rate included articles for quality when applicable. **RESULTS:** Five articles identifying adverse events in seven subjects following spinal manipulation were included in this review, along with two systematic reviews. The articles were published between 1978 and 2009. Two articles describing adverse effects from spinal manipulation on two postpartum patients were included, while the remaining three articles on five patients with adverse effects following spinal manipulation were on pregnant patients. Injury severity ranged from minor injury such as increasing pain after treatment that resolved within a few days to more severe injuries including fracture, stroke, and epidural hematoma. SIGN scores of the prospective observational cohort study and systematic reviews indicated acceptable quality. **CONCLUSIONS:** There are only a few reported cases of adverse events following spinal manipulation during pregnancy and the postpartum period identified in the literature. While improved reporting of such events is required in the future, it may be that such injuries are relatively rare.

Lavelle JM. Osteopathic manipulative treatment in pregnant women. *J Am Osteopath Assoc.* 2012 Jun; 112 (6):343-6.

ABSTRACT: Pregnant women experience extensive physiologic and structural changes during pregnancy that affect their daily functioning. The addition of osteopathic manipulative treatment (OMT) to the standard care of pregnant women has been hypothesized to enhance homeostasis and improve quality of life as the body adapts to these changes. Specifically, it has been postulated that OMT can ease pain in pregnant women by eliminating somatic dysfunction and maintaining proper structure. Also, through the viscerosomatic connection, the hemodynamic changes of the maternal body can be controlled, the duration of labor reduced, and the complications of labor avoided. The author reviews the available literature on the use and effectiveness of OMT during pregnancy.

Owe KM, Nystad W, Skjaerven R, Stigum H, Bø K. Exercise during pregnancy and the gestational age distribution: a cohort study. *Med Sci Sports Exerc.* 2012 Jun;44(6):1067-74.

PURPOSE: The study's purpose was to examine the associations between exercise performed at different time points

during pregnancy and gestational age (GA) in a population-based cohort study. **METHODS:** Data included 61,098 singleton pregnancies enrolled between 2000 and 2006 in the Norwegian Mother and Child Cohort Study, conducted by the Norwegian Institute of Public Health. Self-reported exercise was collected from two questionnaires in pregnancy weeks 17 and 30. GA was determined on the basis of the expected date of delivery according to ultrasound, as registered in the Medical Birth Registry of Norway. We used logistic regression to analyze preterm (<37 completed weeks) and postterm births (≥ 42 wk). Comparison of mean GA by exercise levels was estimated by a general linear model. **RESULTS:** Mean GA for women exercising three to five times a week in week 17 was 39.51 (95% confidence interval [CI] = 39.48-39.54) compared with 39.34 (95% CI = 39.30-39.37) completed weeks for nonexercisers ($P < 0.001$). Mean differences remained for all categories of exercise after adjusting for confounding with the greatest mean difference between exercising three to five times per week in week 17 and nonexercisers (equals 1 d). Similar mean differences in GA were observed by exercise levels in week 30. The greatest protective effect on risk of preterm birth was observed for women exercising three to five times a week in week 17 or 30 (adjusted odds ratio (aOR) = 0.82, 95% CI = 0.73-0.91 and aOR = 0.74, 95% CI = 0.65-0.83, respectively) compared with nonexercisers. On the other hand, women exercising one to two or three to five times per week in week 17 were slightly more likely to have a postterm birth (aOR = 1.14, 95% CI = 1.04-1.24 and aOR = 1.15, 95% CI = 1.04-1.26, respectively). Mean GA did not differ by type of exercise performed during pregnancy. **CONCLUSIONS:** Exercise performed during pregnancy shifted the GA distribution slightly upward resulting in reduced preterm births and slightly increased postterm births.

Marchand AM. A literature review of pediatric spinal manipulation and chiropractic manipulative therapy: evaluation of consistent use of safety terminology. *J Manipulative Physiol Ther.* 2012 Aug 27. [Epub ahead of print]

OBJECTIVE: The purpose of this study was to perform a literature search to identify relevant studies on pediatric spinal manipulation and chiropractic manipulative therapy and to assess if safety terminology was consistent with the International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH). **METHODS:** A literature search was performed in PubMed using the following terms: spinal manipulation pediatric, chiropractic safety pediatric, and

manual therapy safety pediatric. PubMed was searched from inception to April 2012 with no language limitations. The international standards included the terminology of the World Health Organization on side effects, adverse reactions, adverse events and the ICH guideline templates that were adapted for manual therapy for this study. **RESULTS:** Of the 9 relevant articles identified in this study, 3 reported methodology for classifying safety incidents, and all 9 used safety terminology (adverse effects or adverse events). However, terminology was not used consistently. **CONCLUSION:** Most of the articles identified in this literature review did not use terminology consistent with the standards established by the ICH when reporting on safety incidents following pediatric spinal manipulation or chiropractic manipulative therapy. More efforts should be taken to include consistent terminology for studies of spinal manipulation and chiropractic manipulative therapy for children.

Ndetan H, Evans MW Jr, Hawk C, Walker C. Chiropractic or osteopathic manipulation for children in the United States: an analysis of data from the 2007 National Health Interview Survey. *J Altern Complement Med.* 2012 Apr;18(4):347-53. Epub 2012 Mar 2.

OBJECTIVES: The aim of this study was to describe use of chiropractic and/or osteopathic manipulation by children in the United States along with the specific health conditions for which they sought care. **METHODS:** The study was a secondary data analysis of the National Health Interview Survey 2007, Child Alternative Medicine file as well as the Child Core Sample. National population estimates were generated for reported use of chiropractic or osteopathic manipulation (C/OM) by children for specific health conditions. Odds ratios (OR) and 95% confidence intervals (CI) were generated from binary logistic regression models that assessed the likelihood that children of specific characteristics would use this therapy. **RESULTS:** National estimates indicated that 2.3 million children (2.3%) in the United States had used C/OM in 2007. C/OM was the most common complementary and alternative medicine procedure. Children aged 12-18 years were more likely to have seen these providers than were younger age groups (OR=3.4 [95% CI, 2.1-5.5]). Homeopathy (1.2%), massage (1.0), and naturopathy (0.3%) were the next most common procedures. The most common complaints were back and neck pain. Other conditions for which children were seen included other musculoskeletal conditions, sinusitis, allergies, and nonmigraine headaches. Racial categories did not differ significantly regarding use of manipulation, but those children with both mother and father in the

household were more likely to have used this form of care (OR=1.7 [95% CI, 1.1-2.6]). **CONCLUSIONS:** C/OM is primarily used for back and neck pain, which is increasing in prevalence in children. Teens are more likely to use it than are younger children.

Scali F, Pontell ME, Welk AB, Malmstrom TK, Marshall E, Kettner NW. Magnetic resonance imaging investigation of the atlanto-axial interspace. *Clin Anat.* 2012 May 10. doi: 10.1002/ca.22094. [Epub ahead of print]

ABSTRACT: The objective of this study is to examine the anatomy of the atlanto-axial interspace using magnetic resonance (MR) imaging. Two hundred and forty MR images of living subjects were examined for the presence of a posterior dural prominence and oblique hypointense fibers between the first and second cervical neural arches. Of the 240 images analyzed, 64% revealed a posterior concavity of the cervical dura mater. Of this, 24% also revealed oblique, linear hypointense fibers that appeared to be in direct contact with the dura mater. Twenty-three percent of the 240 images revealed oblique, linear hypointense fibers. Of the 23% that exhibited these fibers, 76% had an associated posterior thecal concavity of the cervical dura mater. A posterior dural prominence and oblique hypointense fibers were present in the atlanto-axial interspace in a significant number of randomly selected magnetic resonance images. These findings may represent normal, nonpathological anatomy found on MR images and may be related to a recently reported anatomical structure.

Source: *Clin. Anat.* 2012. © 2012 Wiley Periodicals, Inc.

Humphreys BK. Possible adverse events in children treated by manual therapy: a review. *Chiropr Osteopat.* 2010 Jun 2;18:12.

BACKGROUND: Pediatric manual therapy is controversial within the medical community particularly with respect to adverse events. Pediatric manual therapy (Ped MT) is commonly used by a number of professions such as chiropractors, osteopaths and naturopaths for a variety of treatments in children. Ped MT interventions range from advice, light touch, massage, through to mobilisation and high velocity spinal manipulation. However, current evidence related to adverse events associated with Ped MT is not well understood. **OBJECTIVE:** To update the clinical research literature from the 2007 report by Vohra, Johnston, Cramer and Humphreys on possible adverse events in children treated by spinal manipulation. **METHODS:** A review of the clinical research literature from June 2004

until January 2010 as reported in MEDLINE, PubMed and PubMed Central for adverse events specifically related to the treatment of pediatric cases by manual therapy. **RESULTS:** Only three new clinical studies, one systematic review with meta-analysis and one evidence report were identified. Two clinical studies reported on chiropractic care and one on osteopathic spinal manipulation in children. The systematic review investigated all studies of adverse events and manual therapy and was not specific for pediatric patients. The evidence review focused on effectiveness of spinal manipulation in a variety of musculoskeletal conditions. No serious or catastrophic adverse events were reported in the clinical studies or systematic review. However for adults, it has been estimated that between 0.003% and 0.13% of manual therapy treatments may result in a serious adverse event. Although mild to moderate adverse events are common in adults, an accurate estimate from high quality pediatric studies is currently not available. **CONCLUSIONS:** There is currently insufficient research evidence related to adverse events and manual therapy. However, clinical studies and systematic reviews from adult patients undergoing manual therapy, particularly spinal manipulation report that mild to moderate adverse events are common and self limiting. However serious adverse events are rare and much less than for medication commonly prescribed for these problems. More high quality research specifically addressing adverse events and pediatric manual therapy is needed.

Qu F, Shou J, Ren RX. Effects of acupuncture on the outcomes of in vitro fertilization: a systematic review and meta-analysis. *J Altern Complement Med.* 2012 May;18(5):429-39. Epub 2012 Apr 27.

OBJECTIVES: The objective of this article was to conduct a systematic review with meta-analysis of the trials of acupuncture during in vitro fertilization (IVF) or intracytoplasmic sperm injection (ICSI) treatment on the outcomes of clinical pregnancy, biochemical pregnancy, ongoing pregnancy, implantation rate, live birth, and miscarriage. **SEARCH STRATEGY:** The search was conducted by using MEDLINE®, SCISEARCH, the Cochrane Menstrual Disorders and Subfertility Group trials register, AMED, Cumulative Index to Nursing and Allied Health Literature, EMBASE, Wanfang Database, China Academic Journal Electronic full text Database in China National Knowledge Infrastructure, Index to Chinese Periodical Literature, ISI Proceedings for conference abstracts, and ISRCTN Register and Meta-register for randomized controlled trials. **DATA COLLECTION AND ANALYSIS:** Study selection, quality appraisal, and data extraction were performed indepen-

dently and in duplicate. The measures of treatment effect were the pooled relative risks (RR) of achieving clinical pregnancy, biochemical pregnancy, ongoing pregnancy, implantation rate, live birth, or miscarriage for women in the acupuncture group compared with women in the control group. **RESULTS:** Using the random-effects model, pooling of the effect estimates from all of the 17 trials showed no significant difference in the clinical pregnancy outcome between the acupuncture and the control groups (RR=1.09, 95% confidence interval (CI) 0.94-1.26, p=0.25). No significant differences in the biochemical pregnancy, ongoing pregnancy, implantation rate, live birth, or miscarriage outcomes were found between the acupuncture and the control groups (biochemical pregnancy: RR=1.01, 95% CI 0.84-1.20, p=0.95; ongoing pregnancy: RR=1.20, 95% CI 0.93-1.56, p=0.16; implantation rate: RR=1.22, 95% CI 0.93-1.62, p=0.16; live birth: RR=1.42, 95% CI 0.92-2.20, p=0.11; miscarriage outcomes: RR=0.94, 95% CI 0.67-1.33, p=0.74). **CONCLUSIONS:** No significant benefits of acupuncture are found to improve the outcomes of IVF or ICSI.

Betts D, Smith CA, Hannah DG. Acupuncture as a therapeutic treatment option for threatened miscarriage. *BMC Complement Altern Med.* 2012 Mar 22;12:20.

BACKGROUND: Threatened miscarriage involves vaginal bleeding in a pregnancy that remains viable. This is a common early pregnancy complication with increased risk factors for early pregnancy loss, preterm premature rupture of membranes (PPROM), preterm delivery, low birth weight babies and maternal antepartum haemorrhage. Currently there are no recommended medical treatment options, rather women receive advice that centres on a 'wait and see' approach. For women with a history of unexplained recurrent miscarriage providing supportive care in a subsequent pregnancy improves live birthing outcomes, but the provision of supportive care to women experiencing threatened miscarriage has to date not been examined. **DISCUSSION:** While it is known that 50-70% of miscarriages occur due to chromosomal abnormalities, the potential for therapeutic intervention amongst the remaining percentage of women remains unknown. Complementary and alternative medicine (CAM) therapies have the potential to provide supportive care for women presenting with threatened miscarriage. Within fertility research, acupuncture demonstrates beneficial hormonal responses with decreased miscarriage rates, raising the possibility acupuncture may promote specific beneficial effects in early pregnancy. With the lack of current medical options for women presenting with threatened miscarriage it is timely to examine the pos-

sible treatment benefits of providing CAM therapies such as acupuncture. **SUMMARY:** Despite vaginal bleeding being a common complication of early pregnancy there is often reluctance from practitioners to discuss with women and medical personal how and why CAM may be beneficial. In this debate article, the physiological processes of early pregnancy together with the concept of providing supportive care and acupuncture are examined. The aim is to raise awareness and promote discussion as to the beneficial role CAM may have for women presenting with threatened miscarriage.

Wright WF, Riedel DJ, Talwani R, Gilliam BL. Diagnosis and management of Lyme disease. *American Family Physician* June 1 2012; Vol. 85 No. 11.

ABSTRACT: Lyme disease, caused by the bacterium *Borrelia burgdorferi*, is the most common tick-borne illness in the United States. Transmission occurs primarily through the bite of an infected deer tick (*Ixodes scapularis*). Identification of an erythema migrans rash following a tick bite is the only clinical manifestation sufficient to make the diagnosis of Lyme disease in the absence of laboratory confirmation. The Centers for Disease Control and Prevention recommends a two-tier serologic testing protocol using an enzyme-linked immunosorbent assay initially, followed by the more specific Western blot to confirm the diagnosis when the assay samples are positive or equivocal. The treatment of Lyme disease is determined mainly by the clinical manifestations of the disease. Doxycycline is often the preferred agent for oral treatment because of its activity against other tick-borne illnesses. Preventive measures include avoiding areas with high tick burdens, wearing protective clothing, using tick repellants (e.g., diethyltoluamide [DEET]), performing frequent body checks and bathing following outdoor activities, and instituting environmental landscape modifications (e.g., grass mowing, deer exclusion fencing) to reduce the tick burden. Although there is controversy regarding treatment of post Lyme disease syndrome and chronic Lyme disease, there is no biologic or clinical trial evidence indicating that prolonged antibiotic therapy is of benefit.

B Santhanam, Kendler B. Nutritional factors in autism: an overview of nutritional factors in the etiology and management of autism. *Integrative Medicine* February/March 2012; 11(1): 46-49.

ABSTRACT: Autism is thought to have a multifactorial etiology that includes hereditary and environmental triggers

accompanied by gastrointestinal disorders, such as chronic duodenitis, gastritis, reflux esophagitis, intestinal lymphoid dysplasia, dysbiosis, excessive intestinal permeability, and yeast overgrowth. Food sensitivity, especially to gluten and casein, is a prominent finding, as are autoimmunity, metabolic disorders, heavy metal toxicity, and nutritional deficiencies or excesses. Accordingly, medical practitioners have used dietary interventions with varying efficacy in autism treatment, including gluten and casein-free diets and use of omega-3 fatty acids, zinc, and carnosine. With most of these interventions, anecdotal reports of favorable responses usually exceed the number of scientifically controlled studies, but several of these studies have suggested efficacy. Researchers have concluded that autism therapy may require concurrent, multiple-agent interventions to counter the disease's multifactorial etiology, which they believe to result in a neurologically toxic body burden. Bertrand et al estimate that autism is now twice as prevalent as Down Syndrome, with an occurrence of at least 40 cases per 10,000 children. That number represents a 10-fold increase over the last 2 decades, even when Autism Spectrum Disorder (ASD) and Asperger's syndrome are excluded. Heredity is one causative factor in autism; a 90% concordance rate occurs in identical twins compared to a 30% concordance rate in fraternal twins. Researchers believe that environmental factors during the fetal and neonatal periods and during early childhood trigger the disease's occurrence and that appropriate nutritional interventions prevent or possibly treat it effectively.

Holleman AC, Nee J, Knaap SF. Chiropractic management of breast-feeding difficulties: a case report. *J Chiropr Med.* 2011 Sep;10(3):199-203. Epub 2011 Aug 9.

OBJECTIVE: The purpose of this study is to discuss a chiropractic case of management and resolution of breast-feeding difficulties. **CLINICAL FEATURES:** The case involves an 8-day-old baby unable to breast-feed since 4 days old. Initial examination revealed cervical, cranial, and sacral restrictions. She was diagnosed with craniocervical syndrome by a doctor of chiropractic. **INTERVENTION AND OUTCOME:** Following history and examination, the infant received gentle chiropractic manipulation based on clinical findings. Immediate improvement and complete resolution of the nursing problems were observed after 3 treatments over 14 days. **CONCLUSION:** The results of this case suggest that neuromusculoskeletal dysfunction may influence the ability of an infant to suckle successfully and that intervention via chiropractic adjustments may result in improving the infant's ability to suckle efficiently.

Ozdemir O, Yenicesu GI, Silan F, Köksal B, Atik S, Ozen F, Göl M, Cetin A. Recurrent pregnancy loss and its relation to combined parental thrombophilic gene mutations. *Genet Test Mol Biomarkers* 2012 Apr;16(4): 279-86. Epub 2011 Nov 2.

BACKGROUND AND AIM: Recurrent pregnancy loss (RPL) is a heterogeneous disorder that has been associated with antiphospholipid syndrome and other prothrombotic parameters. We aimed to investigate the prevalence of 12 thrombophilic gene mutations in RPL couples in the current results. **METHOD:** In a total of 543 Turkish women with RPL and 327 of their male partners (870 individuals with RPL), and a control group of 106 fertile couples (control) were analyzed for factor V Leiden (FVL), factor V H1299R, factor II prothrombin G20210A, FXIII V34L, β -fibrinogen -455G>A, plasminogen activator inhibitor-1 (PAI-1), GPIIIa L33P (HPA-1 a/b L33P), methylenetetrahydrofolate reductase (MTHFR) C677T, MTHFR A1298C, ACE I/D, Apo B R3500Q, and Apo E genes. **RESULTS:** The overall, heterozygous and/or homozygous point mutations in FVL-FVR2, ApoE2, PAI-1, MTHFR C677T-A1298C, and ACE genes were associated with RPL. There was no meaningful association between RPL and other studied genes. **CONCLUSION:** The homozygosity of 4G in PAI-1 and MTHFR C677T genes in women with RPL, and heterozygosity of FVL, FVR2, ACE, and ApoE2 genes in both parents play crucial role in RPL and should be considered as a risk factor in RPL. Current results showed that RPL is related to combined parental (not only maternal) thrombophilic gene mutations.

Miller J, Newell D. Prognostic significance of subgroup classification for infant patients with crying disorders: A prospective cohort study. *J Can Chiropr Assoc.* 2012 March; 56(1): 40-48.

INTRODUCTION: Few convincing treatment options have been identified for the excessively crying infant. One explanation may be a lack of identification of patient subgroups. This study used a clinically plausible categorization protocol to subgroup infants and compared changes in symptoms between these subgroups during treatment. **METHODS:** An observational cohort design was employed. All infants presenting with excessive infant crying between July 2007 and March 2008 were categorized into three subgroups, (A) infant colic, (B) irritable infant syndrome of musculoskeletal origin (IISMO) and (C) inefficient feeding crying infants with disordered sleep (IFCIDS) based on history and physical findings. Mothers completed questionnaires which rated their own and their

child's characteristics prior to and at the end, of a course of manual therapy. Independent associations between infant subgroups and changes in continuous outcomes (crying, stress, sleep, and consolability) were assessed. Multi-variable analysis of covariance was used to identify and control for potential confounders. **RESULTS:** A total of 158 infants were enrolled. There was no significant difference in demographic profile between groups or any significant difference in infant crying or level of maternal stress at the start. Only the putative subgroups were significantly associated with differences in outcomes. In general, colic babies improved the most in consolability and crying. **CONCLUSION:** Babies with excessive crying should not be viewed as a homogenous group. Treatment outcomes may be improved by targeting appropriate subgroups prior to treatment.

Negar Foolad N, Brezinski EA, Chase, EP, Armstrong AW. Effect of nutrient supplementation on atopic dermatitis in children: a systematic review of probiotics, prebiotics, formula, and fatty acids. *Arch Dermatol.* 2012;():1-6. doi:10.1001/jamadermatol.2013.1495.

OBJECTIVE: To identify whether nutrient supplementation with probiotics, prebiotics, formula, or fatty acids prevents the development of atopic dermatitis (AD) or reduces the severity of AD in newborns to children younger than 3 years. **DATA SOURCES:** We searched MEDLINE, Cochrane Central Register of Controlled Trials, and LILACS (Latin American and Caribbean Health Science Literature) from January 1, 1946, to August 27, 2012, and performed an additional manual search. **STUDY SELECTION:** Randomized controlled trials and cohort studies examining nutritional supplementation in prevention and amelioration of AD among children younger than 3 years. **DATA EXTRACTION:** Of 92 articles, 21 met inclusion criteria. **DATA SYNTHESIS:** In the 21 studies, a total of 6859 participants received supplements, which included infants or mothers who were either pregnant or breastfeeding; 4134 infants or mothers served as controls. Nutritional supplementation was shown to be an effective method in preventing AD (11 of 17 studies) or decreasing its severity (5 of 6 studies). The best evidence lies with probiotics supplementation in mothers and infants in preventing development and reducing severity of AD. Specifically, *Lactobacillus rhamnosus* GG was effective in long-term prevention of AD development. γ -Linolenic acid reduced severity of AD. Supplementation with prebiotics and black currant seed oil (γ -linolenic acid and ω -3 combination) was effective in reducing the development of AD. Conflicting findings were reported from different research groups that

performed supplementation with an amino acid–based formula. **CONCLUSIONS:** Certain types of nutrient supplementation are beneficial in preventing AD development and reducing its severity. Future research elucidating the mechanisms underlying the actions of nutritional supplementation on AD is necessary.

Prime DK, Garbin CP, Hartmann PE, and Kent JC. Simultaneous breast expression in breastfeeding women is more efficacious than sequential breast expression. *Breastfeeding Medicine*, Volume 7, Number 6, 2012. DOI: 10.1089/bfm.2011.0139.

INTRODUCTION: Simultaneous (SIM) breast expression saves mothers time compared with sequential (SEQ) expression, but it remains unclear whether the two methods differ in milk output efficiency and efficacy. **SUBJECTS AND METHODS:** The Showmilk device (Medela AG, Baar, Switzerland) was used to measure milk output and

milk ejection during breast expression (electric pump) in 31 Australian breastfeeding mothers of term infants (median age, 19 weeks [interquartile range, 10-33 weeks]). The order of expression type (SIM/SEQ) and breast (left/right) was randomized. **RESULTS:** SIM expression yielded more milk ejections ($p \leq 0.001$) and greater amounts of milk at 2, 5, and 10 minutes ($p \leq 0.01$) and removed a greater total amount of milk ($p \leq 0.01$) and percentage of available milk ($p < 0.05$) than SEQ expression. After SIM expression the cream content of both the overall (8.3% [$p \leq 0.05$]) and postexpression (12.6% [$p \leq 0.001$]) milk were greater. During SEQ expression, the breast expressed first had a shorter time to 50% and 80% of the total amount of milk than the breast expressed second ($p \leq 0.05$), but, overall, a similar percentage of available milk was removed from both breasts. **CONCLUSIONS:** SIM expression stimulated more milk ejections and was a more efficient and efficacious method of expression, yielding milk with a higher energy content.



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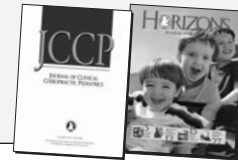
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