JOURNAL OF CLINICAL CHIROPRACTIC PEDIATRICS

VOLUME 21 • NO. 1 • MAY 2022

PUBLICATION OF THE COUNCIL ON CHIROPRACTIC PEDIATRICS
INTERNATIONAL CHIROPRACTORS ASSOCIATION

JCCP
JOURNAL OF CLINICAL CHIROPRACTIC PEDIATRICS

The Journal of Clinical Chiropractic Pediatrics (JCCP) is the official peer-reviewed journal of the Council on Chiropractic Pediatrics, 6400 Arlington Boulevard, Suite 800, Falls Church, Virginia 22042, USA

Editorial Correspondence: Correspondence should be sent to:
Editor, JCCP
ICA Council on Chiropractic Pediatrics
6400 Arlington Boulevard, Suite 800
Falls Church, Virginia 22042, U.S.A.
Email: pediatricscouncil@chiropractic.org
or svallonedc@aol.com

TABLE OF CONTENTS

JCCP JOURNAL OF CLINICAL CHIROPRACTIC PEDIATRICS

VOLUME 21, NUMBER 1 MAY 2022

Publishing Offices:
ICA Council on Chiropractic Pediatrics
6400 Arlington Boulevard, Suite 800, Falls Church, Virginia 22042 U.S.A.

GUIDELINES FOR AUTHORS

JCCP JOURNAL OF CLINICAL CHIROPRACTIC PEDIATRICS

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:

Case Reports and Case Series – presentations of individual or groups of cases deemed to be of interest to the professional and scholarly community.

Pilot Studies or Hypothesis – papers which, while very broad, present with a clear hypotheses and suggest a foundation for future, in-depth studies.

Literature Reviews – studies of existing papers and books presented with the intention of supporting and encouraging new and continuing study.

Technical Descriptions – reports of new analytical/diagnostic tools for assessment and delivery of care. 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.

Guidelines for submission

All manuscripts are accepted purely for consideration. They must be original works and should not be under consideration by any other journal or publisher at the time of submission. They must be accompanied by a TRANSFER OF COPYRIGHT form, signed by all authors and by the employer if the paper is the result of a "work for hire." It is understood that while the manuscript is under consideration it will not be sent to any other publication. In the case of multiple authors, a transmittal letter should designate one author as correspondent.

Manuscripts may be sent to editor at svallonedc@aol.com. Manuscript should be in document style MS Word (or compatible) and unformatted. PDFs will not be accepted.

The paper must include an abstract or summary. This abstract/summary should state the purpose of the paper (objective), procedures, methods, main findings (results) and principal conclusions. Also, any key words or phrases that will assist indexers should be provided.

References must be cited for all materials derived from the works of other people and previously published works. Reference numbers in superscript must be assigned in the order of citation in the paper.

Tables – Each table or figure should be on a separate page and not imbedded in the manuscript. If the table is from another publication, permission to publish must be granted and the publication acknowledged.

Photographs – Photographs may be in color or in grayscale and scanned at 300 dpi with sharp contrast. Patient photographs must have consent form signed by the individual or parent or guardian in the case of a minor.

Informed Consent – If the research/study involves experimental investigations performed on humans the manuscript must include a statement that informed consent was obtained from the individuals involved in the investigation.

Patient Anonymity – Patient names or any information that could identify a specific patient should be avoided. All case reports, with or without identifying photographs accompanying a manuscript must have a consent form signed by the individual or parent or guardian in the case of a minor. These are to include any requests for blocking faces, etc.

Acknowledgements – Any illustrations from other publications must be acknowledged. It is the author's responsibility to obtain written permission from the publisher and/or author for their use.

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.

Instructions to Authors – Summary

See *Uniform Requirements for Manuscripts Submitted to Biomedical Journals* for detailed information http://www.icmje.org/.

General formatting guidelines

- All submission components must be submitted electronically.
- Only manuscripts in English are accepted.
- Submit manuscripts as **Microsoft Word** documents.
- Use 1" margins on all sides
- Use Arial 12 point black font
- Capitalize only the first letter in the title, and any proper nouns.
- Do not justify text.
- Do not use column function
- Number all pages at bottom right.
- Double-space manuscript. Single-space references, tables or figure legends.
- Do not abbreviate words or terms the first time they are introduced; at that time, provide the abbreviation in parentheses and use it from that point forward.
- Number citations consecutively using superscripted Arabic numerals and place all references in a **Reference** section immediately at the end of your section.
- Run spell check and grammar check after completing the manuscript. Use American English spelling and units of measurement.

Submission Components

- ***JCCP* authorship form**—submit separately from manuscript. All authorship forms may be combined in a single PDF. Each author must complete this form, scan and return it electronically to the editor before the manuscript can be processed.
- ***JCCP* Patient (or Parent/Guardian) Permission to Publish Form**—one form for each case (1 for case report; multiple individual forms for case series) — all forms may be combined as a single PDF.
- **Permission to acknowledge forms:** All individuals named in the Acknowledgements section of the manuscript must sign a permission form. The corresponding author may use his or her own form, or use the one *JCCP* provides–submit separately from manuscript. All permission forms may be combined as a single PDF.
- **Cover letter**—submit as separate document, either Word or PDF.

The following items MUST be submitted as a Word document.

Cover letter—Explain why your manuscript is appropriate for *JCCP*.

Document— Each of the following should be on a separate page. Use page break function to separate page, not repeated line breaks to get to a new page.

- Title page
- Abstract
- Manuscript
- Acknowledgements
- References
- Tables
- Figures

Title page

- Title of article—ONLY CAPITALIZE FIRST LETTER OF FIRST WORD
- Running head (limited to 40 characters)
- Word count (excluding references, tables and figures)
- Number of tables
- Number of figures
- Authors
  - Name, with all degrees (do not include Bachelor's level degrees)
  - Current title/position and affiliation, including city, state and country
- Corresponding author
  - Name
  - Mailing address, phone, fax
  - E-mail address; provide alternative e-mail address if possible

Abstract—not to exceed 250 words. It may be structured or unstructured. Structured abstracts usually include the following sections: Purpose, Methods (include study design in this section), Results, Conclusion. For case reports and case series, see document, "Instructions for Case Reports and Case Series."

Manuscript Components

Manuscript length will vary with the type of article; in general, manuscripts are expected to be 1,500-3,000 words in length, excluding references, tables and figures. These may vary with the type of article. For case reports and case series, see, "Instructions for Case Reports and Case Series." In general, for manuscripts reporting research studies, the order of components is:

- Introduction: succinctly describe the relevant literature supporting the need for the study.
- Methods: describe the methods used to accomplish the study, in detail sufficient to allow the informed reader to evaluate their appropriateness.
- Results: present the results of the study, without interpretation.
- Discussion: describe limitations of the study; interpret results; compare results to those of other relevant studies; discuss value and implications of the study.
- Inclusion of appendices is discouraged.

Instructions to Authors – Summary

Tables

- Number tables consecutively in text, using Arabic numerals (1, 2, 3 etc.)
- Place each table on a separate page at the end of the section, immediately following the References section.
- Use "table" function in Word to construct tables; do NOT use tab or space keys to form columns and rows. Use table "normal" style to construct table. Do not insert vertical lines between columns; do not use grids. Place horizontal line under table title and at end of table, separating the table from any footnotes. You may place horizontal lines under headings in the table for clarity.
- Use footnotes to explain details at bottom of the table (below a horizontal line). Identify using either superscripted lower-case letters or standard footnote symbols (sequence: *,†, ‡, §, ||, ¶, **, ††). Sequence the footnotes in the order text is read–from left to right and then down.
- Use left-justification to align numbers in columns.

Figures

- Place figure title and legend on page with the figure.
- Figures must be submitted electronically. Acceptable file formats: DOC, JPG, PDF. Figures may be embedded at the end of the manuscript text file or loaded as separate files for submission purposes. Should not be imbedded within the manuscript text
- Hand-drawn illustrations are not acceptable.
- Provide documentation of permission for any figures that are not original.

Acknowledgements

Include a statement disclosing any funding support for the project or project personnel, or any other potential conflicts of interest. Acknowledge only individuals or organizations who provided input or resources to the project that were above and beyond their usual responsibilities. All individuals acknowledged must provide written permission to use their name; these permissions must accompany the manuscript at the time of submission (scan documents and submit electronically).

Reference format—examples

- *Journal article*: Jefferies LJ, Milanese SF, Grimmer-Somers KA. Epidemiology of adolescent spinal pain: A systematic overview. *Spine* 2007;32:2630-2637.
- Book: Task Force on Community Preventive Services. Guide to Community Preventive Services. New York: Oxford University Press; 2005.
- Website/webpages: Author. Title. Name of website. URL. Date of publication. Updated date (if applicable). Date accessed. Example: Fox F. Promoting and sustaining collaborative networks in pediatrics. Pew Research Center. http://www.pewinternet.org/2013/06/14/promoting-and-sustaining-collaborative-networks-in-pediatrics/. Published June 14, 2013. Accessed September 3, 2017.

Permission to acknowledge forms

All individuals named in the Acknowledgements section of the manuscript must sign a permission form. The corresponding author may use his or her own form, or use the one *JCCP* provides.

Title Page Format

Running Head:
Word count (excluding references, tables and figures):
Number of tables:
Number of figures:

Authors (in correct order)
Name, degrees
Current title/position and institution (if applicable)
City, State, Country

Corresponding Author
Name
Address
Phone Number:
Fax:
Email:

Journal of Clinical Chiropractic Pediatrics Authorship Form

Each author must read and sign the statements on 1) authorship responsibility and contribution, 2) financial disclosure and conflict of interest, 3) copyright transfer. **The corresponding author must sign the Acknowledgement Statement** and email the completed form to Svallonedc@aol.com to initiate manuscript processing.

Manuscript title: _____

1. Authorship Responsibility and Contribution

• I certify that this submission represents original work, and that neither this submission nor a substantially similar one has been published or is under consideration for publication elsewhere in any medium (paper or electronic). I also affirm that this submission is not subject to copyright or any other rights except those of the current authors.

• I certify that if so requested by the editor, I will provide the data or cooperate in obtaining the data on which this submission is based, for review by the journal's designated representative(s).

• I agree that the corresponding author may represent me to review proofs and make other decisions regarding the submission. I have approved the submission.

• I certify that I meet the criteria for authorship, having made substantive contribution to the manuscript as indicated below (check all that apply).

___ Development of project concept or hypothesis
___ Study design and development of methodology
___ Project implementation
___ Data collection and management
___ Data analysis and interpretation of results
___ Literature search and review
___ Manuscript writing
___ Other (specify contribution)_____

2. Financial Disclosure and Conflict of Interest

I certify that all sources of extramural support of this submission, and the role of any funding agencies in the conduct of the study have been clearly described in the Acknowledgements section of the submission.

Check one of the following two statements:

❑ I certify that I have no financial interests, relationships or affiliations related to the project or materials addressed in the submission.

OR

❑ I certify that any potential conflicts of interest, including financial interests, relationships or affiliations related to this submission are disclosed in the Acknowledgements section of the manuscript.

3. Copyright Transfer

In consideration of the action of the *Journal of Clinical Chiropractic Pediatrics* in reviewing and editing this submission (including manuscripts, tables, figures and any supplemental documents), I hereby transfer, assign, or otherwise convey all copyright ownership including all rights and incidental thereto, exclusively to the *Journal of Clinical Chiropractic Pediatrics*.

I also understand that if the manuscript is not accepted for publication by the *Journal of Clinical Chiropractic Pediatrics* I will be notified and the transfer of copyright will be null and void.

_____	_____	_____
Signature	e-mail address	date signed

Acknowledgement statement to be signed by corresponding author

All individuals named in Acknowledgements section should provide written permission. I certify that:

• All individuals who have made substantive contributions to the submission but who do not qualify as authors have been named, along with their specific contribution in the Acknowledgements.

• All individuals so named have provided me with their written permission to be named.

• If no Acknowledgement section is included in the submission, there are no other contributors to the manuscript.

_____	_____	_____
Corresponding Author Signature	e-mail address	date signed

Journal of Clinical Chiropractic Pediatrics

Patient Consent Form for Case Report

Print name:_____

If patient is a minor, print parent/guardian name: _____

I have read the information about me/minor and/or seen the photograph to be published.
I give my consent for this material to appear in a scientific journal.

I understand the following:
(1) My name/minor's name will not be attached to the material. The authors of the article will make every attempt to keep my identity/minor's identity anonymous. I understand, however, that they cannot guarantee complete anonymity. It is possible that someone, such as someone who works in this clinic or one of my relatives, might be able to identify me/minor.

(2) The material will only be published in a scientific journal.

(3) The material will not be used for advertising.

Signed:_____ Today's date: _____
(if patient is a minor, parent or guardian signs.)

Journal of Clinical Chiropractic Pediatrics

Permission to Acknowledge

I give my permission to be acknowledged in the manuscript,

_____

which is to be submitted to the *Journal of Clinical Chiropractic Pediatrics*.

_____ _____
Signature Date Signed

_____
Print Name

Instructions for Case Reports and Case Series

Abstract
The abstract should be 250 words or fewer. It may be either structured or unstructured. If structured, use the same sections as described below for the components of the report (Introduction, Case Presentation, Intervention and Outcomes, Discussion).

Case Report Components

• **Introduction**: State why this case is unusual or important.

• **Methods**: describe the search engine and key words used to review previously published literature on the subject

• **Case presentation**: Provide a brief summary of the patient's presenting demographics, other relevant characteristics, complaint(s) and related symptomatology.

• **Intervention and outcomes**: Describe the course of treatment, including frequency and duration, and summarize the patient's clinical outcomes, using recognized outcome measures if possible. Include whether informed consent was obtained and if there were any adverse events reported.

• **Discussion**: Succinctly state the important aspects of the case, in terms of its implications for patient care in general, or for specific patient populations or conditions. You may also compare/contrast the case to other cases in the published literature. Be cautious about overstating the importance/implications of your case.

Evidence-based Case Report Instructions

An Evidence-based Case Report (EBCR) is NOT the same as a traditional case report. The EBCR focuses on an answerable clinical question, how it was explored in the search, appraising the results and how it applies to the case, along with the integration of this information with the patient interaction. The final stage in this process is to audit the results.

These are the steps to include:[1,2]

• Brief summary of the chief complaint: 50-100 words

• Briefly describe the clinical case: 250-400 words

• Explain how you developed the clinical question: 200-300 words

• Explain your search for evidence (key words, databases used, number of articles retrieved): 50-100 words

• Evaluate the articles retrieved: critically appraise the evidence for validitiy and relevance: 200-300 words

• Describe how you made your clinical decision by applying these findings to the case, including how you considered and integrated the patient's preferences and values: 250-400 words

• Evaluate your performance: 50-100 words

1. Heneghan C, Badenoch D. *Evidence-based Medicine Toolkit*, 2nd ed. Oxford, UK: Blackwell Publishing, 2006. http://onlinelibrary.wiley.com/doi/10.1002/9780470750605.index/summary (download pdf of "all chapters" for free copy of the publication)

2. Jones-Harris AR. The evidence-based case report: a resource pack for chiropractors. *Clin Chiropr* 2003;6 73-84. (download for free from www.chiro.org/cases/FULL/Evidence-based_Case_Report.pdf)

Additional interesting articles to read about EBM and writing and EBCR:

Review an example of an EBCR at:
https://www-ncbi-nlm-nih-gov.uws.idm.oclc.org/pmc/articles/PMC1126937/pdf/302.pdf

Iran J Pediatr. 2010 Sep; 20(3): 261—268. Evidence Based Medicine in Pediatric Practice: Brief Review
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3446038/

J Can Chiropr Assoc. 2014 March; 58(1): 6—7. **Evidence-based case reports**
http://pubmedcentralcanada.ca/pmcc/articles/PMC3924510/

3 BMJ. Vol 7, Issue 3, 2002, **Evidence-Based Medicine in Practice: EBM Notebook**
http://ebm.bmj.com/content/7/3/68

How do we measure up in 2022 caring for children as chiropractors?

By Sharon Vallone, DC, FICCP, Editor

Most chiropractors have heard from our patients about the breakdown in care under the current persisting constraints of telehealth visits. We also hear how the decrease in the healthcare provider workforce has presented a challenge to families seeking immediate or at times, specialized care, for their children.

These challenges have brought many families to our doors because chiropractors have continued to provide safe and effective face to face and hands-on care under the guidelines of their individual state or country's departments of health, and because our patients talk about the care we provide. Many of the new individuals you have met over the last year may not have called upon us had their familiar channels of care been open to them. However, they have chosen to seek our counsel on the direction of another satisfied parent or patient or because our offices are open and available to them.

Chiropractors who treat children should be familiar with red flags that are critical signs that emergency intervention may be required and refer when necessary. Chiropractors are most well-known for seeking the cause of the complaint and correcting it with a focus on the chiropractic subluxation, segmental joint dysfunction, manipulable lesion, soft tissue injury, nutritional deficit, or underlying stress (physical or especially emotional in these chaotic times) that result in the body manifesting the presenting symptoms.

The JCCP presents manuscripts written by our colleagues who share research, literature reviews, protocols, case reports and commentaries to create a well-rounded appreciation of the complexities of pediatric care. We are reminded not to overlook the simple answers when the appearance is complex.

But when the situation is complex, what skills do we have to evaluate, differentially diagnose, refer and treat (Weber/McNamara) our youngest patients? Are we up to date on the cultural trends that affect our young patients, and do we have the experience, insight or language to address the issues that present to us (Loftus)? Do we read the literature to see what other professionals are seeing and saying (Abstracts)?

The importance of reading pediatric literature cannot be emphasized enough. For example, an abstract from the journal, *Pediatrics*, expounds on the recent changes in the developmental milestone guidelines published by the CDC in the United States. Critical reading of this paper is important so that we are aware of what parents are now being told is normal development for their child. It is also important to critique this information through our own clinical lens and discern whether these published guidelines are adequate or if something is missing, why has it been eliminated? Why are we missing previously evaluated milestones? if they have been removed because less children are accomplishing the milestone, were we wrong to be evaluating it in the first place or have we normalized the failure to achieve it without examining why?

If we fail to challenge this, we risk missing important key aspects of child development. For example, the milestone to crawl has been removed from the guidelines. Learning to crawl in a cross-crawl pattern is an important motor milestone that has a profound effect on the infant's neurologic development. If children aren't learning to crawl, why aren't they crawling? Is there a musculoskeletal problem ranging from something as serious as hip dysplasia to something as simple as joint dysfunction as a result of spending too much time in a swaddle? And why are we overlooking the importance of achieving this motor milestone linked to development of right and left hemispheric communication which is critical for the "wholistic" development of the brain's motor and cognitive functions?

Analysis of 15 years of data was performed and new guidelines drawn up with the intention of preventing delays in identifying children who have fallen behind in their development and intervene as early as possible to optimize their progress. But with these modified guidelines, we must also be realistic and monitor how it will be applied in the early childhood evaluative process. Lowering the previous standards will inevitably have an impact on the services that may have been provided by early intervention services under the previous guidelines.

But I digress in order to point out that what we know and what we can yet learn about caring for children is ever evolving. My summation is that our authors attempt to share their experiences, hypotheses, protocols and techniques (Barnes) and each one of them puts a tremendous amount of time and effort into their final product despite being practicing chiropractors, active parents, caregivers, grandparents, first time or prolific authors, researchers, faculty members, institutional leaders, entrepreneurs and professional and community volunteers. I am always amazed at the enthusiasm and dedication of each of them as they prepare their thoughts (and the thoughts of those that walked before them as cited in their papers) for publication. It is a process I have the rare good fortune to follow, issue after issue, without ego or personal gain.

The responsibilities and liabilities of all health care providers including chiropractors have expanded over the course of the last several decades and we need to stay current in our education (whether undergraduate or postgraduate). Our education needs to continually remain current with the evolving international healthcare needs (Papadopoulou). We need to establish and constantly monitor academic standards and practice guidelines. We need to stay current and READ the literature (as well as write it!). We need to communicate with each other and other healthcare professionals as well as our patients effectively and consistently to assure the highest level of care for the children who present to us daily. As a profession, we need to support each other by communicating, sharing information, and offering respectful, professional feedback and continue to raise the bar for the profession, especially as it concerns our pediatric patient base.

Respectfully,
Sharon A. Vallone, DC, FICCP

Commentary: Competencies and Standardization in Chiropractic Pediatric Education: An Opinion on Taking the Next Step

By Anna E.Papadopoulou, MChiro,D.C.,DACNB.,MSc (MSK health in Pediatrics), FRCC
Doctor of Chiropractic, Private practice, Nicosia, Cyprus
Rodou 11, Atlantes 5, Agioi Omologites, Nicosia, Cyprus.
Anna.chiropractic@gmail.com

Competencies and standardization for any profession are a sign of a well-established, healthy organization. Educational as well as professional competencies and standardizations are currently in place to ensure the safety and effectiveness of the chiropractic profession. Different versions of codes of ethics are globally available to guide clinicians and safeguard the public according to each country and region.[1,2,3]

The chiropractic profession has evolved and expanded to create several special interest groups over the years. These include sports, orthopedics, pediatrics, radiology, neurology and animal chiropractic. Unlike the global standardization of the chiropractic profession as a whole, there is a lack of guidelines in terms of special interest groups in general, as well as more specifically in the pediatric chiropractic arena.

It is understood that undergraduate chiropractic education is predominantly concerned with the development of education to further safe and effective practice for chiropractors to serve their community and adhere to evidence-based, collaborative healthcare standards.[4] Although an introduction to special and specific population groups (athletes, geriatrics and pediatrics) are made in the undergraduate curriculum, this is to provide the students exposure to the practice of chiropractic and how it can be applied at different ages in a community's life span. Further training in the specific interest groups is offered at a post graduate level. In 2016, Hewitt, et.al. *Core Competencies of the Certified Pediatric Doctor of Chiropractic: Results of a Delphi Consensus Process* it was stated that, "All doctors of chiropractic are adequately trained in basic pediatric skills and are licensed to examine, treat, and manage pediatric patients."[5]

The goal of this commentary is to examine, in 2022, the education offered to the chiropractic profession, around the world. What does the current curriculum in undergraduate education provide students in chiropractic pediatrics education? Are there any discrepancies between institutions in the curriculum or delivery of undergraduate chiropractic pediatric courses? Are all graduates competent in treating pediatric cases? To further education, what are the additional postgraduate opportunities that are available to globally achieve the above standard in chiropractic pediatric education?

In the 2016 paper, Hewitt et al. stated that there are core competencies that must be met following the completion of a postgraduate education. "Many of these skills naturally overlap with those of the general doctor of chiropractic. Normalizing these competencies does not imply that only certified pediatric doctors of chiropractic may treat children; rather, the certified pediatric doctor of chiropractic has obtained a deeper knowledge and skillset compared to the general doctor of chiropractic."[5] Therefore, the skillsets for chiropractors in the area of pediatrics have been found adequate.

Table one (Pages 1856-1857) shows all current undergraduate chiropractic programs which provide specific pediatric education. The information was gathered from their published information at the time this paper was written and could be incomplete. What the table does show is that there are discrepancies in pediatric chiropractic education in undergraduate chiropractic university programs. Undergraduate pediatric chiropractic education is currently taught in 14/19 schools in North America (73%), 4/8 in Latin America (50%), 5/12 in Europe (42%), and no information is available on the 7 schools in Asia and two in Africa.

The comparison of contact hours and credit hours for pediatrics in the undergraduate programs, not only between schools on different continents but also neighboring countries, may be difficult and this must be taken into consideration by those who regulate chiropractic education, international chiropractic examining bodies and political bodies within the chiropractic profession. This is the time to regroup, reflect and create undergraduate competencies that all approved/accredited chiropractic institutions could adopt to ensure consistency in chiropractic pediatric education. If a baseline of fungible curriculum content were adopted by every undergraduate chiropractic program, it would serve to ensure that all students were credentialed to provide safe care for the pediatric patient.

Are all graduates competent in treating pediatric cases?
This is a good time to evaluate current undergraduate pediatric chiropractic education in terms of theory and contact hours ("hands on time") and chiropractic techniques considered appropriate or modifiable for the pediatric population. In addition, it is appropriate to compare and contrast areas that need to be standardized to establish competencies that apply across the board. Moreover, it is paramount that students understand current research and

are able to utilize such to support their work within special interest groups and to educate the public.

Taking a broad view of the current landscape of undergraduate chiropractic pediatric education, it is appropriate to review the discrepancies in the way undergraduate chiropractic pediatric courses are taught:

- There are a number of differences in the credit hours, course material, hands on experience and amount of educational material provided between educational institutions based in different countries and continents.
- Observing that this is a challenge faced by other professions, like allopathic medicine, allows an opportunity for interprofessional learning. Self-perception surveys on whether the courses fulfill certain criteria /are efficiently preparing students to meet basic competencies is one way utilized by medical educational research to evaluate such points.[6] Additionally, performing cross sectional studies and comparing material against competencies in chiropractic pediatric education may support and enhance undergraduate chiropractic pediatric courses.
- Are all graduates competent in treating pediatric cases, considering that children are not 'small adults' and if not, what are the additional postgraduate opportunities available?[7,8]

More information is needed to draw robust conclusions on these questions. Considering the discrepancies in hours of course delivery and with little information on the quantity and quality of education of new graduates, it is difficult to ascertain whether all graduates have been provided with adequate undergraduate training in pediatrics. Thus, the development of competencies in the basic knowledge and skills to treat children as chiropractors is paramount with the caveat that a graduate can pursue further education in pediatric chiropractic. This can be informed, for example, by the 'Tuning Education Project'.[9]

According to the *Core Competencies of the Certified Pediatric Chiropractor* - Hewitt, et al. 2016 state that, "These postgraduate programs entail between 280 and 400 hours of training taken over 2 to 3 years. As the purpose of these postgraduate training programs is to expand on and deepen the knowledge base obtained during the undergraduate chiropractic curriculum, the resulting competencies (applied to them) will be a combination of both the basic chiropractic training and the additional acquired skills."[5]

Current Chiropractic Profession organization structure

Chiropractic is organized in three tiers, local (National Associations), regional (European Chiropractors Union, Latin American Chiropractic Federation (FLAQ), East Mediterranean Middle East Chiropractic Federation (EMMECF), African Federation etc.) and global level of governance World Federation of Chiropractic (WFC). In this manner, chiropractors are represented in the organizations that create practice policies in over 90 countries.

An excellent example of this structure of command and regulation is observed amongst one of the special interest groups, sports chiropractic International Federation of Sports Chiropractic: (FICS). This special interest group enrolls members who comply with the existing undergraduate chiropractic education requirements and further build upon their knowledge and skills following graduation. Although pediatrics is one of the popular special interest groups within the profession, the FICS structure is not mirrored. A lack of three-tiered (national, regional and global) regulation and representation is observed. Some isolated attempts are seen in different counties such as the Royal College of Chiropractors - Pregnancy and Paediatric Faculty in the UK, Australian College of Chiropractic Paediatrics (ACCP), American Chiropractic Association (ACA) Pediatrics Council and International Chiropractic Association Pediatrics Council.[9] Despite attempts from local associations to create unity and discipline members with guidelines at a local or regional level, there is yet to be a more universal level of organization and competencies to follow.

Creating the three tiers of regulation allows for national cultural consideration, ethical consideration and community customs of each country to be taken into play. Similarly, regional representation can have an overview and collate data from each country and relay information to and from the global representation. It is appreciated that different geographical regions have unique requirements in terms of education. However, the core competencies for chiropractic care of the pediatric patient could be universally accepted and implemented aiding in reduction of educational discrepancies. This ensures a baseline minimum standard of pediatric chiropractic education that provides a guideline for the safety of both the patient and the practitioner.

As seen in the latest professional scoping review by Beliveau et.al 2017, only five articles were cited that included the pediatric patient population.[10] An organized attempt to provide fungible education would help structure and provide more impactful and meaningful and plentiful pediatric research as well.

2022 is an exciting time for the pediatric chiropractic community as a number of initiatives around the world are being or have been put in place to address these concerns. In Europe, especially in the UK, the Royal College of Chiropractic (RCC) and the European Chiropractors' Union (ECU), special interest group (SIG) paediatrics, are drafting history and examination forms that would help standardize the baseline for chiropractic practitioners.[11] Similarly in Australia, there is a world-wide consensus

Name of institution	Location	Is undergraduate chiropractic pediatric education offered?	Is post graduate pediatric education offered?
USA			
Life Chiropractic College West[19]	California	Yes - 3 credits	No
Cleveland University-Kansas City, College of Chiropractic[20]	Kansas City	Yes 3.5 credits	No
D'Youville College [21]	Buffalo, New York	Yes - 2 credits	No
Keiser University[22]	Florida	Yes - 3 credits	No
Life University[23]	Georgia	Yes (22h contact)	No
Logan University[24]	Missouri	Yes 2 credits	YES
National University of Health Sciences[25]	Illinois	Yes - 3 credits	No
Northeast College of Health Sciences[26] (formerly New York Chiropractic College)	New York	Not stated	No
Northwestern Health Sciences University[27]	Minnesota	Yes - 2 credits	No
Palmer College of Chiropractic[28]	Iowa	Yes	YES diplomate-certificate-programs
Parker University[29]	Dallas,Texas	Yes 4 credits	No
Sherman College of Chiropractic[30]	South Carolina	Yes - 4 credits	No
So California University of Health Sciences[31]	California	Yes - 4 credits	No
Texas Chiropractic College[32]	Pasadena, Texas	Yes	No
University of Bridgeport[33]	Connecticut	Not stated (may be part of special groups module)	No
University of Western States[34]	Oregon	Not stated (may be part of special groups module)	No
Canada			
Canadian Memorial Chiropractic College[35]	Toronto, Ontario	Yes (not stated)	No
Université du Québec à Trois-Rivières[36]	Trois-Rivières, Québec	Not stated	No
Latin America			
Mexico			
Universidad Estatal del Valle de Ecatepec[37]	Estado de Mexico	Yes 4h	No
Universidad Estatal del Valle de Toluca[38]	Ocoyoacac, Mexico	Yes	No
Universidad Veracruzana39	VER, Mexico	Not stated	No
Chili			
Universidad Central de Chile[40]	Santiago, Chile	Not stated	No
Puerto Rico			
Universidad Central del Caribe - Doctor of Chiropractic Program[41]	Bayamón, Puerto Rico	Not stated	No
Brazil			
Centro Universitario Uceff[42]	Chapecó, Santa Catarina	Yes 4 credits	No
Universidade Anhembi Morumbi[43]	São Paulo	Yes 4 credits	No
Universidade Feevale[44]	Novo Hamburgo,Rio Grande do Sul	Not stated	No
EUROPE			
Denmark			
Syddansk Universitet Odense[45] (University of Southern Denmark)	Odense, Denmark	Not Stated	No
France			
Institut Franco-Européen de Chiropratique[46]	Campus de Paris	Yes	No
Institut Franco-Européen de Chiropratique[47]	Toulouse, France	Yes credits not stated	No
Spain			
Barcelona college of Chiropractic[48]	Barcelona, Spain	Not stated	No
Madrid College of Chiropractic-RCU[49] (formerly RCU College of Chiropractic)	Madrid, Spain	Yes as part of other special population module	No

Name of institution	Location	Is undergraduate chiropractic pediatric education offered?	Is post graduate pediatric education offered?
Sweden			
Skandinaviska Kiropraktorhögskolan[50] (Scandinavian College of Chiropractic)	Stockholm, Sweden	Not stated	No
Switzerland			
University of Zurich[51]	Zurich, Switzerland	Yes	No
United Kingdom			
AECC University College[52]	Bournemouth, UK	Not stated	Yes
London South Bank University[53]	London, UK	Not stated	No
McTimoney College of Chiropractic[54]	Abingdon, UK	Not stated	Yes
Teesside University[55]	Middlesbrough, UK	Yes - as part of other modules special population	No
University of South Wales - Welsh Institute of Chiropractic[56]	Welsh, UK	Not stated	No
Africa			
Durban University of Technology[57]	Durban	Not stated	No
University of Johannesburg[58]	Johannesburg	Not stated	No
Asia			
New Zealand			
New Zealand College of Chiropractic[59]	New Zealand	Not stated	No
Australia			
Central Queensland University[60]	Queensland, Australia	Not stated	No
Macquarie University[61]	New South Wales, Australia Murdoch WA	Not stated	No
Murdoch University[62]	Melbourne, Australia	Not stated	No
RMIT University[63]		Not stated	Yes
Japan Tokyo College of Chiropractic[64] (formerly RMIT University Chiropractic Unit Japan)	Tokyo, Japan	Not stated	No
Malaysia			
International Medical University[65]	Malaysia	Not stated	No

Table 1: Summary of all chiropractic education institutions, pediatric chiropractic education[19-65]

process being developed to provide standards of practice for chiropractors who see pediatric patients, as a follow-on to the Safer Care Victoria report.[12] When these endeavors are added to the widely accepted best practice consensus processes previously published,[5,13,14] including the current examination of chiropractic pediatric education, the profession's undergraduate and postgraduate curriculum is designed to keep the pediatric patient safe. Adverse events in this age group under chiropractic care have been found to be exceedingly rare.[12,15-18] It is of utmost importance that a focus on education ultimately provides a focus on safety. Keeping the patients of this profession safe, as it has proven to be in the last 100 years, is of primary importance.

Conclusion:

In conclusion, ensuring a uniform minimum undergraduate education in pediatric chiropractic will raise the standard of education, skill set and experience of chiropractors and allow an easier transition to this domain's postgraduate studies. This could potentially allow doctors of chiropractic to hold the credential of 'expert in the pediatric MSK (PMSK) field' through development and maintenance of rigorous standardized competencies.

It is this author's sincere desire to see all organizations involved in pediatric chiropractic education come together to strengthen the education provided, create consistency

in education and enhance the professional level of care offered and provide enhanced and continued safety for the patient. Creating three-tiered chiropractic pediatric special interest groups would enhance and develop the consistent collection of data and support of current research as well as inform future research needed to be done in areas such as safety, effectiveness and clinical management of pediatric chiropractic care.

References:

1. Canadian Chiropractic Association, The Code of Ethics, 2022 https://chiropractic.ca/about-cca/code-of-ethics/ Accessed: 3 March 2022.

2. General Chiropractic Council, The Code: Standards of conduct, performance and ethics for chiropractors, 2019. https://www.gcc-uk.org/i-am-a-chiropractor/guidance/the-code, Accessed 3 March 2022.

3. Australian Chiropractors Association: The ACA Code of Ethics, 2022 https://www.chiro.org.au/about-aca/code-of-ethics/ Accessed 3 March 2022.

4. The International Chiropractic Education Collaboration Clinical and Professional Chiropractic Education: a Position Statement. World Federation of Chiropractic Educational Statement formulated in November 2014 at the Miami Education Conference. https://www.cmcc.ca/documents/international-chiropractic-education-collaboration-position-statement.pdf Accessed 12 March 2022.

5. Hewitt E, Hestbaek L, Pohlman KA. Core Competencies of the Certified Pediatric Doctor of Chiropractic: Results of a Delphi Consensus Process. *J Evid Based Complementary Altern Med*. 2016 Apr;21(2):110-4. doi: 10.1177/2156587215622769. Epub 2016 Jan 5. PMID: 26739669.

6. Nieto-Gutierrez W, Hanae Zafra-Tanaka J, Pacheco-Barrios K, Taype-Rondan A. Self-perception of competences in clinical practice among recently graduated physicians from Lima, Peru.2020;6: 11.Published 2020 https://doi.org/10.1016/j.heliyon.2020.e05424.

7. Larcher V. (2015) Children Are Not Small Adults: Significance of Biological and Cognitive Development in Medical Practice. In: Schramme T., Edwards S. (eds) *Handbook of the Philosophy of Medicine*. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-8706-2_16-1.

8. Vallone SA, Miller J, Larsdotter A, Barham-Floreani J. Chiropractic approach to the management of children. *Chiropr Osteopat*. 2010;18:16. Published 2010 Jun 2. doi: 10.1186/1746-1340-18-16.

9. Bologna Process. Tuning educational structures in Europe: Work programme of the Bologna Follow-up group 2001-2003, modified: 18/05/2016; http://www.ehea.info/cid101886/tuning-educational-structures-europe.html Accessed 11 March 2022.

10. Beliveau PJH, Wong JJ, Sutton DA, et al. The chiropractic profession: a scoping review of utilization rates, reasons for seeking care, patient profiles, and care provided. *Chiropr Man Therap*. 2017;25:35. Published 2017 Nov 22. doi:10.1186/s12998-017-0165-8.

11. Weber S and Miller AS, Chiropractic history and examination forms for the infant, pre-school, and school-aged child. *Journal of Clinical Chiropractic Pediatric*. 2021;20:1 https://www.jccponline.com/JCCP20-02.pdf .

12. Genevieve Keating. Parent reports of chiropractic care for children: A preliminary report from 22,043 parents in Australia. *Journal of Clinical Chiropractic Pediatric*. 2021;20:1. https://jccponline.com/keating20-01.pdf .

13. Hawk C, Schneider M, Ferrance RJ, Hewitt E, Van Loon M, and Tanis L. Best practices recommendations for infants, children and adolescents: Results of a consensus process. *JMPT* 2009;32.8:639-647.

14. Hawk C, Schneider MJ, Vallone and Hewitt EG, Best practices for chiropractic care of children: A consensus update. *JMPT* 2016; 39 (3):158-168.

15. Zorzela L, Boon H, Mior S, Yager J, Gross A, Vohra S. Serious adverse events associated with pediatric complementary and alternative medicine. *Eur J Integr Med*. 2014;6:467—72. https://doi.org/10.1016/j.eujim.2014.05.001.

16. Todd AJ, Carroll MT, Robinson A, & Mitchell EKL. Adverse events due to chiropractic and other manual therapies for infants and children: A review of the literature. *J Manipulative Physiol Ther*, 2015,38(9), 699-712. https://doi.org/10.1016/j.jmpt.2014.09.008

17. Vohra S, Johnston BC, Cramer K and Humphreys K. Adverse events associated with pediatric spinal manipulation: a systematic review. *Pediatrics* [online]. 2007.

18. Miller J. Safety of Chiropractic Manual Therapy for Children: How Are We Doing? *J Clinical Chiropractic Pediatrics* 2009 (Dec); 10 (2): 655—660.

19. Life Chiropractic College West https://lifewest.edu/academics/class-schedule/ Published 2021. Accessed February 24, 2022.

20. Cleveland University-Kansas City https://www.cleveland.edu/academics/college-of-chiropractic/concurrent-dcbs-program/ Published 2008-2021. Accessed February 24, 2022.

21. D'Youville University. Chiropractic D.C. & lt; D'Youville University. https://catalog.dyouville.edu/degree-programs/health-professions/chiropractic-department/chiropractic-dc/#requirements txt. Published 2021. Accessed February 24, 2022.

22. Keiser University https://www.keiseruniversity.edu/accredited-chiropractic-degree-programs-at-keiser-university/ published 2022. Accessed February 24, 2022.

23. Life Chiropractic College https://www.life.edu/academic-pages/chiropractic-program/chiropractic-curriculum/ Published 2015. Accessed February 24, 2022.

24. Logan University https://www.logan.edu/wp-content/uploads/2021/09/DC-ADP-2021-2022.pdf Published 2021. Accessed February 24, 2022.

25. National University of Health Science https://portal.nuhs.edu/documents/DC.pdf Published 2022. Accessed February 24, 2022.

26. Northeastern Health Sciences University https://www.northeastcollege.edu/webdocs/registrar/DC_Curriculum.pdf? Published 2022. Accessed February 24, 2022.

27. Northwestern Health Sciences University https://nwhealth.smartcatalogiq.com/en/2019-2020-Archived/University-Catalog/College-of-Chiropractic Published 2022. Accessed February 24, 2022.

28. Palmer College of Chiropractic https://www.palmer.edu/wp-content/uploads/2021/12/main-campus-sample-curricular-schedule.pdf Published 2022. Accessed February 24, 2022.

29. Parker University https://www.parker.edu/doctor-of-chiropractic-curriculum/ Published 2022. Accessed February 24, 2022.

30. Sherman College of Chiropractic https://www.sherman.edu/wp-content/uploads/2020/03/Curriculum-Guide_SU-23-Graduates_revisedx.pdf Published 2022. Accessed February 24, 2022.

31. Southern California University of Health Sciences https://www.scuhs.edu/doctoral-degrees/doctor-of-chiropractic/ Published 2022. Accessed February 24, 2022.

32. Texas Chiropractic College https://www.txchiro.edu/academics/doctor-of-chiropractic/ Published 2022. Accessed February 24, 2022.

33. University of Bridgeport https://www.bridgeport.edu/academics/programs/chiropractic-dc/curriculum Published 2022. Accessed February 24, 2022.

34. University of Western States https://ftp.uws.edu/udocs/public/Admissions/DCP_New_Curriculum_Draft.pdf Published 2022. Accessed February 24, 2022.

35. Canadian Memorial Chiropractic College https://www.cmcc.ca/academic-programs/year-iii-curriculum Published 2022. Accessed February 24, 2022.

36. University of Quebec at Trois-Rivières https://oraprdnt.uqtr.uquebec.ca/pls/public/gscw031?owa_no_site=5005 Published 2022. Accessed February 24, 2022.

37. Universidad Estatal del Valle de Ecatepec https://www.uneve.edu.mx/alumnosssss/PDF/horarios/Horarios20221/HORARIOS%202022-1%20QUIRO.pdf Published 31/08/2020, Accessed February 24, 2022.

38. Toluca Valley State University https://unevt.edomex.gob.mx/sites/unevt.edomex.gob.mx/files/files/Oferta%20Educativa/Mapa%20Curricular%20Quiro%202017.pdf Published 2017, Accessed February 24, 2022.

39. Universidad Veracruzana https://www.uv.mx/ Published 2022. Accessed February 24, 2022.

40. Universidad Central de Chile https://www.ucentral.cl/noticias/fac-cs-de-la-salud/centros/programa-de-quiropraxia-ucen-es-miembro-oficial-de-la-red-de Friday, September 4, 2020.

41. Universidad Central del Caribe - Doctor of Chiropractic Program https://www.uccaribe.edu/soc/academic-program/ Published 2020. Accessed February 24, 2022.

42. Centro Universitario Uceff https://www.uceff.edu.br/uceff/itapiranga/curso/quiropraxia Published 2020. Accessed February 24, 2022.

43. Universidade Anhembi Morumbi https://www.uceff.edu.br/uceff/itapiranga/curso/quiropraxia Published 2020. Accessed February 24, 2022.

44. Universidade Feevale https://www.feevale.br/en/education/undergraduate-studies Accessed February 24, 2022.

45. Southern Denmark University https://www.sdu.dk/en/uddannelse/kandidat/klinisk_biomekanik Published 2022. Accessed February 24, 2022.

46. Institut Franco-Européen de Chiropratique https://www.ifec.net/en/le-programme/ Published 2022. Accessed February 24, 2022.

47. Institut Franco-Européen de Chiropratique-Toulouse https://www.ifec.net/en/le-programme/ Published 2022. Accessed February 24, 2022.

48. The Barcelona College of Chiropractic https://bcchiropractic.es/ Published 2022. Accessed February 24, 2022.

49. Madrid College of Chiropractic-RCU (formerly RCU College of Chiropractic) https://www.rcumariacristina.com/wp-content/uploads/2019/03/CHIROPRACTIC-CURRICULUM-2014_2019-copia.pdf Accessed February 24, 2022.

50. The Scandinavian Chiropractic Academy https://www.kiropraktorhogskolan.se/ Accessed February 24, 2022.

51. University of Zurich https://www.med.uzh.ch/en/Medizinstudium/chiropraktikstudium.html Published 2021. Accessed February 24, 2022.

52. AECC University College https://www.aecc.ac.uk/study/our-courses/undergraduate-courses/chiropractic/masters-in-chiropractic-mchiro-hons/ Published 2021. Accessed February 24, 2022.

53. London South Bank University https://www.lsbu.ac.uk/study/course-finder/imsc-chiropractic-2022-23 Accessed February 24, 2022.

54. McTimoney College https://www.mctimoney-college.ac.uk/undergraduate-studies/integrated-undergraduate-masters-in-chiropractic-

mchiro/programme-modules/ Published 2022. Accessed February 24, 2022.

55. Teesside University https://www.tees.ac.uk/undergraduate_courses/nursing_&_health/msci_(hons)_chiropractic_(with_foundation_year).cfm%20 Published 202022. Accessed February 24, 2022.

56. University of South Wales - Welsh Institute of Chiropractic University of South Wales - Welsh Institute of Chiropractic https://www.southwales.ac.uk/courses/master-of-chiropractic/ Published 2022. Accessed February 24, 2022.

57. Durban University of Technology https://dut-cdn2.azureedge.net/wp-content/uploads/career_leaflets/HSc%20Chiropractic.pdf Published 2022. Accessed February 24, 2022.

58. University of Johannesburg https://www.uj.ac.za/faculties/health-sciences/departments-2/chiropractic/master-of-health-science-chiropractic/ Published 2021. Accessed February 24, 2022.

59. New Zealand College of Chiropractic http://chiropractic.ac.nz/study-with-us/programme-structure/ Published 2022. Accessed February 24, 2022.

60. Central Queensland University https://handbook.cqu.edu.au/he/courses/view/CB77?_gl=1*1wva4da*_ga*MzE0MjQ2OTkwLjE2NDgwNTcxNTc.*_ga_HZ0LQNHND8*MTY0ODA1NzE1Ni4xLjAuMTY0ODA1NzE1Ni42MA..&_ga=2.178358176.520536797.1648057157-314246990.1648057157 Accessed February 24, 2022.

61. Macquarie University https://mq.edu.au/study/find-a-course/courses/master-of-chiropractic#course-structure Accessed February 24, 2022.

62. Murdoch University https://www.murdoch.edu.au/course/undergraduate/b1331 Accessed February 24, 2022.

63. RMIT University https://www.rmit.edu.au/study-with-us/levels-of-study/undergraduate-study/bachelor-degrees/bachelor-of-health-sciencebachelor-of-applied-science-chiropractic-bp280/bp280hsddausbu Published 2022. Accessed February 24, 2022.

64. Tokyo College of Chiropractic https://www.chiro.jp/carricuram.html Accessed February 24, 2022.

65. International Medical University https://www.imu.edu.my/academics/undergraduate/chiropractic/#1622153622152-0a1aa27e-d354 Accessed February 24, 2022.

Breastfeeding and ASD: A spectrum of challenges

Yolande Loftus, LLB
Copyeditor and Journalist at Autism Parenting Magazine
editor@autismparentingmagazine.com
0027 79 795 7702

ABSTRACT

As their children are diagnosed with autism, many mothers are discovering their own neurodivergence. With the long-overdue acknowledgment of mothers' position on the spectrum, pregnancy, parenting and breastfeeding issues of autistic women should become a priority for the scientific and healthcare community. Beyond the protective benefits of breastfeeding for reducing autism risk, the breastfeeding experience of autistic women also deserves a much closer look.

Key Words: autism, breastfeeding, protective properties of breastmilk in autism, autistic mothers breastfeeding, atypical sensory experience.

Introduction

More than 20 years ago the Centers for Disease Control (CDC) started tracking the number and characteristics of eight-year-old children with autism through the Autism and Developmental Disabilities Monitoring Network (ADDM).[1] Behind those early prevalence statistics were children diagnosed with autism spectrum disorder (ASD), children who are now adults. Neurodivergent adults dealing with many of life's milestone events like securing and improving employment prospects, getting married, conceiving, and for some new mothers, breastfeeding.

Would a mother on the spectrum, diagnosed or not, be any more or less likely to breastfeed? Would an infant, especially those with an elevated genetic risk of developing autism, obtain greater benefits from being breastfed exclusively for a prolonged period?

Research does highlight the benefits of breast milk for mothers and infants, more specifically, the potential protective effect of exclusive breastfeeding against ASD.[2] While such studies suggest lower autism rates linked to higher levels of breastfeeding, other autism risk factors are difficult to exclude.

The protective potential of breast milk against autism is only part of the puzzle; unfortunately, the topic of autistic women breastfeeding their neurodivergent, or even neurotypical infants, is a discussion that receives far less attention from the scientific community.

This article will focus on breastfeeding not only in terms of the effect and association of breast milk on ASD, but also the breastfeeding experience of autistic women.

Autism and breastfeeding

ASD is a highly heritable condition, therefore parents diagnosed with autism, parents who believe they may be on the spectrum, and those who already have an autistic child may be especially interested in the protective and beneficial properties of breast milk in ASD.

Many studies support breastfeeding for a mother and infant's physical and emotional health; popular media campaigns proclaim: "Breastfeeding saves lives," and "Breast is best." Breastfeeding as it pertains specifically to autism is a less mainstream topic, but more research is slowly trickling in. In fact, a recent retrospective survey study found decreased prevalence of autism in Fragile X Syndrome in response to long-term or exclusive breastfeeding in comparison to formula feeding.[3]

More encouraging results emerged from a meta-analysis examining the association of breastfeeding status with the risk of autism.[4] The authors shared the following:

- According to their dose-response meta-analysis, breastfeeding a baby for 6 months was linked to a 54% reduction in risk
- In the conventional meta-analysis, the greatest reduction in the risk of autism spectrum condition was associated with prolonged breastfeeding of young children, between 12 to 24 months

The conclusion of the authors highlights the importance of breastfeeding to reduce the risk of autism. This may be a sound conclusion, reached after a meticulous meta-analysis, but for many women it may feel like a scientific reprimand. This recommendation comes from authors in ivory labs where poor, painful latching is a myth, where tactile sensitivities do not cause feelings of rage and agitation and where mothers are not feeling isolated and unworthy of their title. Such advice is of little support to mothers on the autistic spectrum who may be dealing with all of the aforementioned challenges.

Neurodivergence and breastfeeding

High breastfeeding initiation rates reveal most mothers want to breastfeed.[5] Many have firm plans to feed their infant an exclusive diet of breast milk, but the physical and emotional health of the mother, insufficient milk supply, and support struggles may get in the way.[6] For neurotypical women postpartum depression, other children, work, health conditions like mastitis and even the way the baby feeds may interfere with breastfeeding.

For autistic women these challenges are often present but may be overshadowed by struggles caused by the very characteristics of their neurodivergence. Breastfeeding advice is usually tailored to the neurotypical mother; many lactation consultants may be unaware that almost all autistic individuals have atypical sensory experiences.[7]

In fact, research suggests tactile and auditory hypersensitivity may predict an ASD diagnosis.[8] While such sensory abnormalities are increasingly investigated in the pediatric population, the sensory experience of a breastfeeding mother on the spectrum remains a mystery mainly whispered about on blogs and online forums.

A crying child, latching on incorrectly causing pain for the mother, and frustration for the infant, is often part of the initial breastfeeding challenge.[9] This ordinary scenario seems more disconcerting when happening to a mother with auditory and tactile sensitivities. Especially when many in the autism community mention sensory overload as a meltdown trigger.

In the above situation a new neurotypical mother may seek guidance from family, friends and professionals. For the new autistic mother, an attempt to seek guidance or even participate in commiseration with other mothers may be as daunting as breastfeeding. A study examining the experience of motherhood from autistic women's perspective found the women battled to find appropriate support.[10]

The women interviewed spoke of feeling "misunderstood, judged and dismissed." It impacted their ability to receive support for themselves and their children. In stark contrast, when healthcare professionals understood autism, the women interviewed felt acceptance and respect.[10]

Another review found autistic adults experience challenges and dissatisfaction communicating with health care providers throughout pregnancy and birth.[11] Other results from this systematic review include:

- Autistic mothers are more likely to experience depression during and after pregnancy.[11] (It is interesting to note that breastfeeding struggles have been linked to postnatal depression, while breastfeeding itself could be associated with a lower risk of postnatal depression; conflicting results have been reported in literature.)[12]
- Autistic mothers may experience more pregnancy complications.[11] (Research indicates such complications may hinder breastfeeding.)[13]

With autism prevalence rates rising, it behooves professionals in all spheres of medicine to become more well versed in treating individuals with autism. The aforementioned studies highlight the negative consequences of autistic individuals seeking support, only to be met with stigma, negative judgments or ignorance. To gain insight about the lived experience of such situations–from women on the spectrum–we need to give these women a judgment-free platform to educate us.

For a long time, nursing mothers have criticized literature and research penned by out-of-touch male academics; for women with atypical sensory experiences and significant social-communication differences, current breastfeeding literature and advice may seem even less relevant.[14]

Underdiagnosed, overwhelmed

Women may camouflage or mask certain symptoms of autism for social acceptance. Autism is probably underdiagnosed in females, with research suggesting some autistic females may be missed by the current diagnostic procedures.[15] Should these undiagnosed autistic women have children, such children will have a higher risk of ASD and protective properties of breast milk may be especially relevant.

This leads to speculation–as little research is available–about the probability of women with autistic traits breastfeeding their infants, and the implications of protection for infants with a potentially elevated risk.

From the (scarce) research delving into the autistic woman's breastfeeding experience, it seems as though common themes include: powerful sensory perception with feelings of "over-touch and overstimulation," "focused determination," and the unique experience of each individual where "one size does not fit all."[16]

It's dangerous and unfair to generalize about neurodivergent women's attitude to breastfeeding, especially because the autism spectrum is so broad. Research does seem to suggest, however, that autistic mothers who decide to breastfeed may be intensely driven.[10] Particularly as some autistic mothers view their children (respectfully) as their "special interest." They focus every ounce of energy on their newborn. Their knowledge of the benefits of breast milk means they breastfeed, even when it is a daily struggle.

The author interviewed a neurodivergent mother who was still breastfeeding her 15-month old daughter every two hours, every single night. She was exhausted, worryingly underweight, but her black and white outlook meant prolonged breastfeeding was non-negotiable.

During a recent interview for the Autism Parenting Summit (April 2022), Dr. Natasha Campbell-McBride, the creator of the GAPS diet, recommended breastfeeding a child for at least three years. Her own child was diagnosed with autism, and her breastfeeding recommendations were firm.

This kind of advice may seem non-negotiable to an autistic woman who wants to reduce the risk for her infant. The reality of breastfeeding for three years while dealing with intense sensory issues, with little appropriate support, seems extreme.

This may be the reason some mothers on the spectrum cease to breastfeed after their first overwhelming attempt. The first few weeks after giving birth, when babies feed on demand, may be especially tough for autistic mothers, as autism is often characterized by insistence on sameness and a love of routine and structure.

Even highly sensitive neurotypical mothers reveal the overwhelm of breastfeeding. They whisper, in fear of judgment, about the respite of handing the baby to dad for bottle feeding. This may be an important coping mechanism for new moms; even more so for mothers with postnatal depression, where a break for self-care may be vital. Healthcare, CAM (complementary and alternative medicine), and family support in addition to self-care is especially relevant for mothers on the spectrum, as research tell us more than 20% may also have a comorbid anxiety disorder (in children with ASD almost 40% have concomitant anxiety disorders).[17]

The idea of a perfect mother, a beatific smile on her face, breastfeeding her quiet baby in her freshly cleaned lounge is the reason so many women–neurotypical and neurodivergent–struggle in silence through the first few months.

Autistic women face an additional challenge. When they reveal their diagnosis, to appeal for support and accommodations, they may face the stigma of not being a good enough parent due to their neurodivergence. Conversely, they may hide their diagnosis from healthcare professionals, to avoid such stigma. This may, however, expose them to a different type of judgment. Lack of eye contact and social communication struggles are often unfairly judged as "cold" behavior, as it contrasts to preconceived notions of what a mother should look like.

Against the odds

Despite the stigma, despite the challenge of breastfeeding with an overwhelmed sensory system, many autistic mothers breastfeed successfully. It is left to speculation (rather than having solid statistics) until studies provide any estimate of success or failure. What can be reasonably conjectured is that most of these women need better support.

Support (accepting of the unique parenting style of autistic mothers) could mean more babies are breastfed for prolonged periods of time. When one considers autism with its challenging symptoms and concomitant medical conditions (like gastrointestinal disorders occurring in up to 84% of children on the spectrum) it makes sense to encourage breastfeeding for infants who may have an elevated genetic ASD risk.[18]

The missing ingredient in breast milk

When dealing with mothers who want to breastfeed, particularly neurodivergent mothers, healthcare professionals and lactation consultants should aim for an empathetic, holistic approach. This may be challenging for those who are not familiar with neurodivergent conditions like autism–especially the different ways it presents in women. Camouflaging to avoid ASD stigma, girls and women are often missed or misdiagnosed by doctors.[19]

When healthcare professionals are knowledgeable, and accepting of neurodivergence, their support may be especially beneficial for the unique needs of this population. As a practical example, an autistic mother who plans to breastfeed should be made aware of the importance of vitamin D and the consequences of deficiencies of this important vitamin in breastfeeding.

Vitamin D, the so-called sunshine vitamin, has an alarming deficiency prevalence. Breastfeeding women are at a higher risk of vitamin D deficiency in comparison to non-breastfeeding women.[20]

The fetus (and newborn baby) will be affected by maternal vitamin D concentrations; a mother who is deficient will be breastfeeding from a depleted level and without supplementation the baby will also be deficient in this vital vitamin.

This may be especially concerning for parents of autistic children, or mothers with a higher genetic risk of having a baby with autism. Results from a recent study seemed to confirm an increasing body of evidence suggesting early childhood concentrations of vitamin D may be involved in an increased risk of neurodevelopmental conditions like autism spectrum disorder.[21]

Research details the incredible results from an open trial study where about 80% of children showed improvement in core autism symptoms with high dose vitamin D.[22] The connection between vitamin D deficiency and autism will need further investigation and more research, but mothers should be made aware of the risks and vulnerable groups may need to be advised about supplementation.

The complicated benefits of breast milk

The protective benefits of breast milk with respect to ASD seem clear. There are even suggestions of protection against gastrointestinal problems which most children on the spectrum experience–and gastrointestinal issues are thought to increase the severity of autism symptoms.

For women's health, breastfeeding offers protection against breast cancer, and it might also protect against ovarian cancer and type 2 diabetes.[22] But breastfeeding is complicated, and such benefits may matter little when core autism symptoms interfere with any attempt by the mother.

Healthcare: accommodating neurodivergence

For autistic adults in general, and autistic mothers in particular, the barriers to accessing healthcare can be substantial. Healthcare providers, including those in the mental health field, may be unfamiliar with the needs and challenges specific to autistic patients.

Most autistic individuals are highly averse to making phone calls; a health care provider's reliance on phone calls and other traditional methods of communicating may create barriers to access.[23] This is but one simplistic example demonstrating how healthcare providers' ignorance of neurodivergence can be disabling for autistic individuals.

Improving access to care and improving the quality of care for a neurodivergent population requires sensitivity training for the health care practitioner. Broadening these skills should include but not be limited to:

- Providing sensory considerate care (communicating what an exam involves before touching the patient and understanding that their "pain threshold" may differ substantially from that of the neurotypical patient).
- Cultivating a wider spectrum of communication skills including: asking clear, concrete questions; allowing for atypical processing times when asking such questions; and an understanding of the differing response methods nonspeaking individuals on the spectrum may employ, ranging from sign language to communication programs on devices like an iPad.
- It may be helpful to provide alternative, accessible forms of communication when appropriate (longer appointments, text-based communication or visual aids, for example).[24]

Conclusion

Most autistic women want more judgment-free information about breastfeeding, they need more support tailored to their neurodivergent needs and acceptance of decisions made in the best interest of their babies.[25]

For the autistic adults, part of the initial CDC prevalence statistics, parenting challenges may be significantly less when stigma is removed and support is increased, especially amongst the healthcare providers that serve this population. Autistic women should receive care that takes their unique support needs into consideration. Such support should be extended to autistic fathers too, another group whose experience and needs warrant more attention.

References:

1. Centers for Disease Control and Prevention. Autism and Developmental Disabilities Monitoring (ADDM) Network. https://www.cdc.gov/ncbddd/autism/addm.html Accessed February 17, 2022.

2. Manohar H, Pravallika M, Kandasamy P, Chandrasekaran V, Rajkumar RP. Role of Exclusive Breastfeeding in Conferring Protection in Children At-Risk for Autism Spectrum Disorder: Results from a Sibling Case-control Study. *J Neurosci Rural Pract*. 2018;9(1):132-136. doi:10.4103/jnrp.jnrp_331_17 .

3. Westmark CJ. Consumption of Breast Milk Is Associated with Decreased Prevalence of Autism in Fragile X Syndrome. *Nutrients*. 2021;13(6):1785. Published 2021 May 24. doi:10.3390/nu13061785.

4. Ghozy S, Tran L, Naveed S, et al. Association of breastfeeding status with risk of autism spectrum disorder: A systematic review, dose-response analysis and meta-analysis. *Asian J Psychiatr*. 2020;48:101916. doi:10.1016/j.ajp.2019.101916.

5. Centers for Disease Control and Prevention. Breastfeeding Report Card. https://www.cdc.gov/breastfeeding/data/reportcard.htm Accessed March 17, 2022.

6. Wray A, Garside J. Why do mothers stop breastfeeding before 6 months? A literature review. *Journal of Health Visiting* 6 (2018): 240-246. doi:10.12968/johv.2018.6.5.240.

7. Balasco L, Provenzano G, Bozzi Y. Sensory Abnormalities in Autism Spectrum Disorders: A Focus on the Tactile Domain, From Genetic Mouse Models to the Clinic. *Front Psychiatry*. 2020;10:1016. Published 2020 Jan 28. doi:10.3389/fpsyt.2019.01016.

8. Jussila K, Junttila M, Kielinen M, et al. Sensory Abnormality and Quantitative Autism Traits in Children With and Without Autism Spectrum Disorder in an Epidemiological Population. *J Autism Dev Disord*. 2020;50(1):180-188. doi:10.1007/s10803-019-04237-0.

9. Carnes D, Plunkett A, Ellwood J, et al Manual therapy for unsettled, distressed and excessively crying infants: a systematic review and meta-analyses *BMJ Open* 2018;8:e019040. doi: 10.1136/bmjopen-2017-019040.

10. Dugdale AS, Thompson AR, Leedham A, Beail N, Freeth M. Intense connection and love: The experiences of autistic mothers. *Autism*. 2021;25(7):1973-1984. doi:10.1177/13623613211005987.

11. McDonnell C, DeLucia E. *Autism in Adulthood*. Mar 2021.100-115. https://www.liebertpub.com/doi/10.1089/aut.2020.0046

12. Rivi V, Petrilli G, Blom JMC. Mind the Mother When Considering Breastfeeding. *Front Glob Women's Health*. 2020;1:3. Published 2020 Sep 15. doi:10.3389/fgwh.2020.00003.

13. Takahashi, K., Ganchimeg, T., Ota, E. et al. Prevalence of early initiation of breastfeeding and determinants of delayed initiation of breastfeeding: secondary analysis of the WHO Global Survey. *Sci Rep* 7, 44868 (2017). doi.org/10.1038/srep44868

14. Stiller, G, Yate, Zainab, Considerations of Sensory Sensitivities of Adult Women on the Autism Spectrum During Lactation, *Clinical Lactation* Vol 12 Issue 4, doi:10.1891/CL-2021-0006.

15. Ratto AB, Kenworthy L, Yerys BE, et al. What About the Girls? Sex-Based Differences in Autistic Traits and Adaptive Skills. *J Autism Dev Disord*. 2018;48(5):1698-1711. doi:10.1007/s10803-017-3413-9.

16. Wilson, Jane & Andrassy, Bri. (2021). Breastfeeding Experiences of Autistic Women. MCN: *The American Journal of Maternal/Child Nursing*. Publish Ahead of Print. 10.1097/ doi:10.1097/NMC.0000000000000779.

17. Nimmo-Smith V, Heuvelman H, Dalman C, et al. Anxiety Disorders in Adults with Autism Spectrum Disorder: A Population-Based Study. *J Autism Dev Disord*. 2020;50(1):308-318. doi:10.1007/s10803-019-04234-3.

18. Al-Beltagi M. Autism medical comorbidities. *World J Clin Pediatr*. 2021;10(3):15-28. Published 2021 May 9. doi:10.5409/wjcp.v10.i3.15.

19. Gesi C, Migliarese G, Torriero S, et al. Gender Differences in Misdiagnosis and Delayed Diagnosis among Adults with Autism Spectrum Disorder with No Language or Intellectual Disability. *Brain Sci*. 2021;11(7):912. Published 2021 Jul 9. doi:10.3390/brainsci11070912.

20. Gellert, S., Ströhle, A. & Hahn, A. Breastfeeding woman are at higher risk of vitamin D deficiency than non-breastfeeding women - insights from the German VitaMinFemin study. *Int Breastfeed J* 12, 19 (2016). doi.org/10.1186/s13006-017-0105-1.

21. Lee, B.K., Eyles, D.W., Magnusson, C. et al. Developmental vitamin D and autism spectrum disorders: findings from the Stockholm Youth Cohort. *Mol Psychiatry* 26, 1578—1588 (2021). doi.org/10.1038/s41380-019-0578-y.

22. Victora CG, Bahl R, Barros AJ, et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *Lancet*. 2016;387(10017):475-490. doi:10.1016/S0140-6736(15)01024-7.

23. Howard PL, Sedgewick F. 'Anything but the phone!': Communication mode preferences in the autism community. *Autism*. 2021;25(8):2265-2278. doi:10.1177/13623613211014995.

24. Kim C. Accessible Health Care for Autistic Adults. Autistic Women and NonBinary Network (AWN). 2014 June: https://awnnetwork.org/accessible-health-care-for-autistic-adults/.

25. Loftus Y. Breastfeeding and Autism Spectrum Disorder. *Autism Parenting Magazine*. 2021; https://www.autismparentingmagazine.com/breastfeeding-autism-child.

Collaborative chiropractic management of breastfeeding difficulties in a neonate: A case study

Catriona McNamara B.Sc; M.Chiro; DACCP; Gonstead Diplomate
Brisbane, Australia
catrionamcnamara@icloud.com

ABSTRACT

Poor weight gain in the neonatal period is concerning. This paper outlines the management of care for a 3-week-old neonate that had significant weight loss and breastfeeding difficulty. Recognition of dysfunction in the mechanical aspects of breastfeeding by the International Board-Certified Lactation Consultant led to referral to a chiropractic clinic. This case study outlines the role that a chiropractor may play in encouraging the breastfeeding dyad with a collaborative approach. Chiropractic recognition of cervical, temporomandibular and shoulder dysfunction in the infant during the early crucial phase may assist this population in establishing good breastfeeding function. This paper describes the biomechanical, neurological, and clinical indicators, circumstances, and what role they may play in affecting the continuation of exclusive breastfeeding.

Key Words: Chiropractic, Infant, Neonate, Breastfeeding, Pediatrics, IBCLC.

Introduction
Chiropractors are often utilised by parents of infants with breastfeeding difficulties. Early intervention to encourage and support the breastfeeding dyad is important in establishing a consistent and functional breastfeeding relationship. Chiropractors are well placed to recognise dysfunction that may have been due to a neuromuscular origin from inutero positioning or the birth process. Spinal dysfunction is one aspect that has been recognised as a factor that may contribute to poor latching or sucking.[1-3] Hawk et al (2018) concluded that there was a "moderate level of favourable evidence supporting the use of manual interventions for infants with musculoskeletal dysfunctions and suboptimal breastfeeding."[4]

Breastmilk is, of course, the nutrition of choice for infants and very few mothers set out on their journey as a new mother thinking that they will not be able to engage successfully in this fundamental activity.[5] Breastfeeding success has lifelong benefits to both mother and child. Formula feeding is not ideal, but it is also a necessary alternative sometimes. When managing this population in clinical practice it is important that the health professional understands the normal mechanics of breastfeeding. The functional aspect of breastfeeding involves many neuromuscular and positional aspects to combine in harmony. A first-time mother faced with a difficult birth or lack of support could be a recipe for early cessation of breastfeeding. Chiropractors can play a significant role, alongside other health professionals, in encouraging exclusive breastfeeding where possible.

Case History
A 3-week-old female neonate was brought to the clinic by her mother and father for chiropractic care after recommendation from their lactation consultant. She had been assessed for tongue tie with an International Board-Certified Lactation Consultant (IBCLC) and suggested chiropractic care due to a complex birth and some ambiguity on whether tongue dysfunction was the main cause for breastfeeding concerns.

The infant had been struggling to attach and latch consistently to the breast. The mother reported pain and frustration at the length of time at the breast and the number of times she had to reattach the infant. The infant would often arch, fuss and cry at the breast while feeding and although the mother reported an abundance of milk supply the infant had not returned to birth weight at 2-weeks.

The parents discussed their distress for the infant and the fact that it was taking about an hour to feed the baby. She would then fall asleep at the breast waking about 40 minutes later ready for the next feed. Both parents reported they were exhausted and were considering moving to formula as it was all becoming too difficult.

The infant was their first live birth at a hospital, vaginally delivered after 25 hours of labour with use of forceps after 2 hours of final stage. APGAR scores were 7 and 9 at 1 and 5 minutes respectively. Birth weight was 3850g and head circumference was 35cm.

Clinical Findings
Initial physical examination revealed an underweight (3210g), sleepy female infant. All vital signs were within normal limits.

Gentle palpation revealed right occiput restriction and

right shoulder A-P restriction. Moro reflex was diminished on the right in first and 2nd phase. Her right TMJ was also restricted, and on opening the jaw, the gape was narrow on the right side. The rooting and suck reflexes were slightly sluggish. On inspection there were some faded red marks on the side of her head which the parents explained were from the forceps. Tongue lateralisation and elevation was good but sluggish on the right, especially noted on crying. All other neurological examinations were within normal range.

Chiropractic Diagnosis
This infant had a restricted C1/Occiput joint, right temporomandibular and glenohumeral joint restriction which could possibly be linked to a long labor and use of forceps at birth.

Chiropractic Treatment

Visit 1: (3 weeks old)
Initial treatment consisted of Gonstead based ASRS occiput rocking articulation within the physiological range of motion in accordance with the Chiropractic Board of Australia's directive for treatment for the under 2-year-old. Appropriate modifications were made according to the infant's size, age, and skeletal maturity.

A right a-p glenohumeral impulse was also made to encourage better motion in right shoulder. The infants' arm held at 90o lateral abduction, the thumb and index finger of the hand holding the humerus contacting the proximal humerus as close as possible to the humeral head with the other hand stabilizing the scapula and clavicle to prevent shoulder girdle movement.

Gentle muscle release was also applied to her sub occipital muscles, right pterygoids, mentalis, orbicularis oris, digastric, suprahyoid and buccinator muscles. Particular attention was given to encourage right TMJ mobility.

Visit 2: (3.5 weeks old)
Three days later, the infant returned. The parents reported slight improvement on attachment and less fuss associated with feeding. Feeding time had reduced to 40 minutes. The same treatment was applied again with encouragement to discuss feeding options with their IBCLC again.

Visit 3 (4 Weeks old)
One week after the initial visit, the parents presented the infant and mother related that there was significant improvement. The mother reported a more comfortable, deeper latch and less fussiness when placed at the breast. Feeding was taking about 30 minutes. The infant had also increased her weight by 350g. The infant had improved in suck strength and function but Moro on the right was still diminished. At this point she did not need another occiput treatment but did require another shoulder adjustment.

Visit 4: (5 weeks old)
She was seen once more a week later and again had gained another 350g. Shoulder function was still slightly decreased, and her jaw was still asymmetrical. Gonstead ASRS occiput rocking articulation was given on this visit along with suprahyoid muscle release, right GH joint adjustment and TMJ release.

During this appointment care options were discussed, deciding that we would leave the next treatment until she was 8 weeks (3 weeks later) and if at that point she continued to improve we would review again at 12 weeks old.

Visit 5: (8 weeks old)
Parent reported continued no maternal pain/discomfort, weight gain and improvement on attachment, alertness, and ability to feed "quickly" (20 minutes). She was no longer falling asleep at the breast and was consistently smiling and relaxed after a feed. Her weight at this point was 5090g. Mild dysfunction was noted in her right TMJ and Glenohumeral Joint with some mild functional asymmetry still present and gentle adjustments were given.

Visit 6: (12 weeks old)
During this review clinical assessment revealed a weight of 6107g, head circumference of 39cm and good functional head control on tummy time. Pull to sit was good with no head lag. Dysfunction was noted in her right TMJ and glenohumeral joint with some mild functional asymmetry still present.

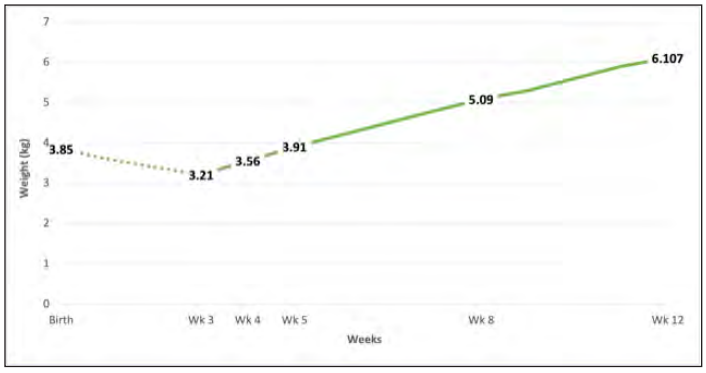


Figure 1. Weight graph for infant.

Discussion
Breastfeeding can be a joyous, engaging time for a new mother or it can be fraught with high anxiety, pain, and frustration. Despite most mothers embarking on this journey, few continue successfully. Breast milk provides many benefits for the mother and infant including valuable

nutrition and immunological support. In 2017-18 around 61% of children between 4-47 months had been exclusively breastfed to at least 4 months of age.[6]

The impact of the birthing process and any possible bruising or strain to an infant's cranium, neck or extremities can be difficult to assess on an infant.[7] Equally as difficult is establishing any causal properties that can be contributing to suboptimal breastfeeding. In Australia an IBCLC is often the first point of contact for the mother that is struggling with breastfeeding. Irritation and strain on structures such as the cranium, neck, temporomandibular joint or shoulder could impede successful breastfeeding journey.[8-12] Recognition of dysfunction and management of these infants should be shared among a number of health practitioners to encourage the breastfeeding dyad for as long as possible. Lavigne found that about 50% of IBCLC's were comfortable recognizing musculoskeletal issues in babies and 91% noticed improvement in breastfeeding after manual therapy.[13]

To swallow with your chin up and neck in an extension, such as a Gonstead listed Anterior Superior Occiput (AS) is near impossible. If there is a restriction at this level, then the stylohyoid and styloglossus muscles which attach to the styloid process will be altered. An infant that has a substantial AS occiput position may also have other associated compensatory muscles in spasm such as levator scapularis and upper trapezius. The sub occipital muscles will also be in contraction and often these infants present with an abnormally "strong neck" from birth. The hypoglossal nerve exits just lateral to the occipital condyles and next to the occipital bone and atlantooccipital joint capsule. It has been suggested that the hypoglossal nerve can be irritated by cervicocranial dysfunction.[14,15] Dysfunction to the hypoglossal nerve may impair tongue function and an infant attempting to coordinate latch, suck, swallow and breathe. Disruption to this coordination could also be linked with mechanical insult at birth to the normal cervical motion and neurological structures which may lead to breastfeeding difficulties. Sixty muscles and the vagus, trigeminal, facial, hypoglossal, accessory nerves along with the brainstem are involved with the wonderful synchrony of latching, sucking, swallowing, and breathing associated with breastfeeding.[16]

Identifying a pattern of restriction in infants, associated with certain presentations, is important for quick recognition and consequent treatment. A Gonstead ASRS occiput on motion palpation will display right lateral flexion restriction, normal extension, and a right occipital flexion restriction.[17] When examining the C0/C1 joint — the practitioners' hand is looking for the atlanto-occipital space to either open (flexion) or close (extension) under the index finger.[3,17,18] In this case the right capsular ligament of the condyle lateral mass articulation may become infiltrated with fluid and consequently the capsule can become distended and rise on the ipsilateral side, which is named ASRS.[3,17,18]

Poor motion in the neck or TMJ can compromise a neonate's ability to find a comfortable position for feeding and other muscles may be utilised to 'survive'.[19] This compensation can continue for many months or even years. Infants have a significantly larger range of cervical motion (Rotation 110 degrees and lateral flexion 70 degrees) than in adults and it is important to recognise any decrease in normal infant motion.[20]

The upper cervical spine function requires normal tone of sub occipital muscles, upper trapezius, sternocleidomastoid, levator scapularis to stabilise and perform normal tasks. Asymmetry in cervical range of motion could also be associated with positional plagiocephaly and upper cervical dysfunction.[8,9,19,21] Decreased cervical range of motion may lead to compensatory dysfunction in the muscles associated with the temporomandibular joint or shoulder.

Stewart noted that glenohumeral dysfunction was present in 70% of infants presenting with breastfeeding difficulties and Fludder and Keil identified the right glenohumeral joint to be more common than the left for extremity joint dysfunction in this age group.[3,8] A diminished unilateral Moro Reflex could also be an indication for a glenohumeral joint dysfunction. Marked spasm in the upper trapezius and or levator scapularis can, along with glenohumeral dysfunction reduce the range of motion of the shoulder. The scapula muscles are involved in stabilising and coordinating efficient glenohumeral motion.[22]

Addressing the orofacial myology component of an infant with breastfeeding difficulties has huge benefits for a disorganised suck.[10] Korbmacher 2005 reported orofacial myofunctional disorders in children such as incompetent lips have been linked with functional asymmetry of the upper cervical spine where they found 352 children with asymmetry in occipito-cervical region on x-ray and 70% had orofacial myofunctional disorders.[23]

There are so many factors that may influence a poor breastfeeding experience and possible early cessation of breastfeeding. Mothers and babies with suboptimal feeding require appropriate support which is specific to each dyad. It is important to recognise the muscular and biomechanical balances as well as any positional difficulties that may prevent them feeding efficiently. Tongue tie, oral muscle development, cranial nerve dysfunction, latching/ positional issues could be included in a huge list of functional issues that may present to the chiropractor's office.[24] In this case the referral for chiropractic treatment by the IBCLC was indeed a successful outcome. Dysfunction

in areas such as the shoulder, cranium, temporomandibular joint and cervical spine can impact on the normal mechanics of the breastfeeding infant.[14,15,24-27]

Conclusion

The neonate experiencing breastfeeding difficulties in the absence of pathology should be evaluated by a chiropractor to ascertain any neuromuscular dysfunction that could be a contributing factor. Breastfeeding is a coordinated action involving a combination of the tongue, perioral muscles, neck function and jaw mobility. In this case, a 3-week-old infant presented with poor attachment, feeding behaviour and discomfort for the mother. After two chiropractic treatments the mother reported a more comfortable feed, improved suck and latch function and a significant weight gain. In this case, chiropractic intervention played a crucial role in the improvement of breastfeeding success for this dyad.

A collaborative approach including an International Board-Certified Lactation Consultant (IBCLC) is important for the continued support for the breastfeeding dyad. Frank and consistent discussions between professionals in a collaborative case is essential. Low force manual therapy for the infant is specific, repeatable and includes a thorough assessment to ensure that the treatment required is necessary. Further research in this area is warranted with a larger more controlled sample group.

References:

1. Miller J E, Miller L, Sulesund AK, & Yevtushenko A. Contribution of chiropractic therapy to resolving suboptimal breastfeeding: A case series of 114 infants. *Journal of Manipulative and Physiological Therapeutics*, 2009, 32, 670—674.

2. Fludder,C. J. Bourgeouis J. (2020) Chiropractic Managament of an infant with breastfeeding difficulty and poor weight gain: A case study. *Breastfeeding Review* 2020; 28(1),21-28

3. Stewart, A. Paediatric chiropractic and infant breastfeeding difficulties: A pilot case series study involving 19 cases. *Chiropractic Journal of Australia*. 2012, 42, 98—107.

4. Hawk, C., Minkalis, A., Webb, C., Hogan, O., & Vallone, S. Manual interventions for musculoskeletal factors in infants with suboptimal breastfeeding: A scoping review. *Journal of Evidence-Based Integrative Medicine*, 2018, 23, 1—12.

5. Walker, WA. Initial Intestinal Colonization in the Human Infant and Immune Homeostasis. *Annals of Nutrition and Metabolism*, 2013, 63(s2), pp.8—15.

6. Australian Institute of Health and Welfare (AIHW) 2022, Australia's children, viewed 10 April 2022, https://www.aihw.gov.au/reports/children-youth/australias-children

7. Davies NJ, Fallon JM. *Chiropractic Pediatrics*. Churchill Livingstone; 2010

8. Fludder, CJ & Keil, BG The prevalence of extremity joint dysfunction in neonates and infants within a paediatric chiropractic clinic. *Chiropractic Journal of Australia*, 2017, 45(4), pp.360—367.

9. Fludder, CJ & Keil, BG. Instrument- Assisted Delivery And The Prevalence Of Reduced Cervical Spine Range Of Motion In Infants. *Chiropractic Journal of Australia*, 2018a 46, 162-171

10. Wall, V. & Glass, R. Mandibular Asymmetry and Breastfeeding Problems: Experience From 11 Cases. *Journal of Human Lactation*, 2006, 22(3), pp.328—334

11. Alcantara, J, Alcantara, JD. & Alcantara, J. The Chiropractic Care of Infants with Breastfeeding Difficulties. *EXPLORE: The Journal of Science and Healing*, 2015, 11(6), pp.468—474.

12. Tow J, Vallone S. Development of an Integrative Relationship in the Care of the Breastfeeding Newborn: Lactation Consultant and Chiropractor. *Journal of Clinical Chiropractic Pediatrics* June 2009; Volume10 (1): 626-632.

13. Lavigne, V. (2016). Lactation consultants' perceptions of musculoskeletal disorders affecting breastfeeding. *Clinical Lactation*, 2016, 7, 30—36.

14. Holtrop, DP. Resolution of suckling intolerance in a 6-month-old chiropractic patient. *Journal of manipulative and physiological therapeutics*, 2000, 23(9), pp.615—618.

15. Vallone S. Carnegie-Hargreaves F. The infant with dysfunctional feeding patterns — The chiropractic assessment. *Journal of Clinical Chiropractic Pediatrics* May 2016; 15(2):1230-1235

16. Smith, L. J. Impact of birthing practices on the breastfeeding dyad. *Journal of Midwifery and Women's Health*, 2007, 52, 621—630.

17. Plaugher G (ed). Textbook of Clinical Chiropractic. Baltimore: Williams & Wilkins. 1993

18. Anrig, C & Plaugher, G. *Pediatric Chiropractic*. Philadelphia, Lippincott Williams & Wilkins. 2011

19.Vallone S. Evaluation and treatment of breastfeeding dysfunction associated with cervicocranial dysfunction: a chiropractic perspective. *Journal of Clinical Chiropractic Pediatrics* 2016 Dec; 15(3):1301-1305.

20. Ohman, A & Beckung, E., Reference values for range of motion and muscle function of the neck in infants. *Pediatric Physical Therapy*: Spring 2008 20(1): 53-58.

21. Pastor-Pons, I, Lucha-López, MO, Barrau-Lalmolda, M, Rodes-Pastor, I, Rodríguez-Fernández, ÁL Hidalgo-García, C & Tricás-Moreno, JM. Active Cervical Range of Motion in Babies with Positional Plagiocephaly: Analytical Cross-Sectional Study. Children (Basel, Switzerland), 2021, 8(12), 1146. https://doi.org/10.3390/children8121146

22. Paine, R., & Voight, M. L. The role of the scapula. *International journal of sports physical therapy*, 2013, 8(5), 617—629.

23. Korbmacher H1, Koch LE, Kahl-Nieke B. Orofacial myofunctional disorders in children with asymmetry of the posture and locomotion apparatus. *Int J Orofacial Myology*. 2005 Nov;31:26-38

24. Peck, K. & Vallone, S. A clinician's guide to pediatric oral motor development. *J Clin Chiropr Pediatr*: Dec 2020(19:2): 1708-1713

25. Holleman, AC, Nee, J. & Knaap, SFC. Chiropractic management of breast-feeding difficulties: a case report. *Journal of Chiropractic Medicine*, 2011, 10(3), pp.199—203.

26. Fludder, CJ & Keil, BG. Presentation of neonates and infants with spinal vs extremity joint dysfunction. *Chiropractic Journal of Australia*, 2018b. 46(1), pp.79—91.

27. Vallone, S. Chiropractic Evaluation and Treatment of Musculoskeletal Dysfunction in Infants Demonstrating Difficulty Breastfeeding. *Journal of Clinical Chiropractic Pediatrics*, 2004, 6(1), pp.349— 368.

Pediatric headache questionnaire, exam and history forms for the chiropractor

Sue A. Weber DC, MSc Chiropractic Pediatrics
Chairperson EAC SIG Pediatrics, FEAC, FRCC
Practitioner Stockholm, Sweden
Corresponding author: Sue A. Weber
dr.sue@telia.com

ABSTRACT

The academic arm of the European Chiropractic Union (ECU) is the European Academy of Chiropractic (EAC). Within the EAC are special interest groups (SIG) focusing on postgraduate education for chiropractors in the areas of pediatrics, neurology, clinical chiropractic and sports chiropractic. Children are one of the unique populations presenting to the chiropractor requiring a different skill set than that utilized to assess the adult patient. In recognition of this, the EAC's SIG for pediatrics has developed history, examination and questionnaire forms for children with headache. The aim of these forms is to assist the chiropractor in identifying red flags and to skillfully differentially diagnose headaches as they present throughout growth and development. The process of development of these forms is outlined, and three forms are presented in this article.

Key Words: pediatric headache, chiropractic pediatric, pediatric history form, pediatric examination form, pediatric red flags, pediatric questionnaire.

Introduction

Chiropractic education typically includes a cursory level of education within pediatrics[1] which varies from institution to institution. Chiropractors interested in pediatrics can pursue additional education through courses in continuing professional development (CPD), a diplomate, and/or a Master's degree. These are available through a range of providers. Surveys from 2004 and 2014 assessing random samples of licensed Canadian Doctors of Chiropractic and Naturopaths have shown that the majority of practitioners questioned treated children of all ages, but felt they their education did not provide adequate skills in assessment and treatment.[1]

Triaging musculoskeletal (MSK) and non-MSK complaints is of the highest priority when assessing the pediatric patient with headache.[2] Some apparently benign headache presentations may have serious red flag causes, such as increased intracranial pressure, nocturnal epilepsy, possible brain tumor and/or cerebellar dysfunction.[3] Table 1 provides a check list for Red Flags.

Other conditions which present with headache at first glance may be due to potentially disabling pathology, including mitral valve disease,[4] hypothyroidism[5] and epilepsy.[6] Ability to triage is therefore a vital skill and knowledge base for practitioners to develop when seeing the pediatric patient with headache, as differential diagnosis and treatment vary significantly from the adult patient.[7]

Table 1. Red Flags[3]

	✓/×	
Features of cerebellar dysfunction:	___	ataxia
	___	nystagmus
	___	intention tremor
Features of increased intracranial pressure:	___	night/early morning vomiting
	___	large head
	___	papillodema
New neurological deficits:	___	recent squint
	___	focal seizures
Possible brain tumor:	___	progressive symptoms < 3 months
	___	"worst headache ever"
Nocturnal epilepsy:	___	abnormal movement or behavior during sleep
	___	strange noises during sleep
	___	extremely tired in the morning
	___	tongue biting
	___	enuresis
	___	falling out of bed
Waking up at night due to severe headache	___	
Change in behavior	___	
Change in personality	___	
Change in coordination	___	
Change in balance	___	

Aims
The EAC is working to provide postgraduate education for practitioners. One focus of the EAC SIG pediatric group has been to work with the various European chiropractic educational institutions to standardize the level of education within pediatrics. Another primary goal is to raise the advanced education around pediatric practice on an institutional and individual level.

The pediatric SIG is a team of four, each with advanced education within chiropractic and/or pediatrics (post-graduate Master's degree or PhD), and each with expertise in clinical practice, research, and/or education.

Fungible pediatric headache questionnaires, history and examination forms specific to chiropractors and other manual therapists have not yet been made available. Consequently, a key initiative of the SIG over the past year has been to provide special history and examination forms particular to specific problems which present to chiropractors. The headache forms presented in this article have been designed to organize the history and examination for the pediatric headache.

Tables 2 is a questionnaire for the family to fill out, Table 3 is the history form and Table 4 provides an examination for ages 5-16, giving it form and consistency, aiding the practitioner in undertaking a thorough assessment.

These are intended as a screening tool for assessing the pediatric patient presenting with headache. The primary focus is on differential diagnosis of headaches throughout development. Two recent articles focus on headaches in children[8,9] and are a good complement to these forms. One article focuses on differential diagnosis of common headaches in children presenting to the chiropractor[8] and the other details the changing phenotype of migraine headache through growth and development.[9] By highlighting red flag presentations,[3] there is an emphasis on safety, particularly identifying and referring the ill child for medical assessment and care. These forms are helpful in reaching the goal of arriving at the correct diagnosis or diagnoses, in order that the proper management can be recommended.

Process
The pediatric headache questionnaire, history, examination and red flag forms have been reviewed by all members of the SIG in an extensive, iterative process spanning nine months. Within the SIG an initial draft was created, multiple iterations were developed, and meetings were held to discuss and resolve disagreements by consensus. In total, three meetings were held between members of the SIG. This iteration was then shared with and reviewed by chiropractors with expertise in the pediatric patient, and their comments were reviewed by the author. The questionnaire was then translated into Swedish and used with a subset of patients to test its relevance.

Recommendations for chiropractors
The author recommend adopting these forms for clinical practice and to use them as an adjunct to the basic pediatric history and exam forms presented earlier.[10] Just as these forms reflect the fact that the child is growing and developing, treatment is also adjusted based on age and development.

Additional special exam forms to complement the history and examination forms for common complaints presenting to the chiropractor, such as the crying infant, growing pains, and scoliosis are currently being developed. A series of recorded lectures to accompany these forms are in progress, discussing key aspects of the history and examination of the pediatric patient. These will be soon available through the European Chiropractic Union home page, European Academy of Chiropractic (EAC) and the General Education Network for Chiropractic (GEN-C).

Conclusion
These forms represent a minimum standard for assessing pediatric headache in patients to ensure safe and effective management. The implementation of these forms should not only raise competence of practitioners, but with widespread use, enable data collection on a large scale for future research. The work to provide specific clinical exam forms is to elevate the safety and quality of musculoskeletal care provided by chiropractors to babies, children, and their families.

Acknowledgements
These forms were developed with significant contributions from Dr.Amy S. Miller (MSc, PhD) and Prof Lise Hestbaek (DC, PhD)

Table 2. Headache Questionnaire (HA): Children

Genetics: Family history headaches (HA): _____

What kind of headaches: _____

What are symptoms: _____

Do they respond to treatment: _____

Psychosocial situation:

Exposure to abuse or bullying: _____

Neurodevelopmental disorder (ADHD, ADD, ASP, other): _____

anxiety: _____ depression: _____

counselling: _____ gender identity: _____

Biomechanical: trauma history _____

_____

(including fall _____ concussion _____ head _____ mouth injuries _____

Health history

allergy _____ asthma _____ eczema _____ epilepsy _____

cardiac anomaly _____ CNS infection (borrelia) _____ intracranial bleed _____

Headache characteristics

How old are you today? _____ When did headache or headache episodes begin, what age? _____

Do you have more than one kind of headache? _____

Describe headaches symptoms: _____

Where is the headache pain? _____

Have headaches changed since they started? _____

Do you have neck pain or stiffness? _____

How long does a headache episode last? _____

How strong is the pain? 0= no pain, 10= worst pain ever: _____

Is your headache worse with running or straining yourself? _____

Is your headache worsened by prolonged screen time? _____ Studying or reading? _____

How much screen time (phone, iPad, laptop) per school day? _____ How much on weekends? _____

What triggers your headaches? _____

Are you stressed? _____

What relieves your headache? _____ Does sleep relieve headache? _____

How often do you take medication, what kind? _____ Does medication help? _____

Does the headache interfere with school _____ Sports _____ Social activities _____ Screen time _____

Do you see the board in school well? _____ Have you checked your vision? _____

History of Periodic syndromes

Infancy: colic _____ torticollis _____

Toddler: seeking dark room _____ head banging _____

Child: dizziness _____ leg pain _____ stomach pain _____ repeated vomiting _____ light sensitive _____

sound sensitive _____ nausea _____ vomiting _____ motion sickness _____

episodes of fever not related to an illness _____ joint pain _____

visual disturbances _____ seeing flashing spots _____ feeling pins and needles _____

behavior problems _____ ADHD _____

sleep history _____

sleep disturbances: grinding teeth _____ night terrors _____ nightmares _____ apnea _____ snoring _____

Table 3. Headache history children from 5 year

Family history HA: _____

what kind: _____

Symptoms: _____

Treatment/outcome: _____

Psychosocial situation family and peers: signs of abuse _____ bullying _____

Neurodevelopmental disorder _____ anxiety _____ depression _____

Trauma history: head and/or neck _____ mouth _____ fall _____

Health history

allergy _____ asthma _____ eczema _____

CNS infection (borrelia) _____ intracranial bleed _____ surgeries _____

perinatal complications _____ illnesses _____ epilepsy _____

cardiac anomalies _____ hypothyroidism _____

medications/treatment: _____

other: _____

Headache characteristics

At what age did headaches begin _____ Where is the headache _____

Symptoms: _____

duration _____ intensity _____ frequency _____ neck pain _____

Have headaches changed since they started? _____

Exacerbating factors: physical activity _____ homework/screen time _____ other _____

Headache triggers _____

Aggravating factors _____

Relieving factors: sleep _____ rest _____ other _____

ADL impact (e.g. school attendance, social and sports activities): _____

Medication use and response: _____

screen time: _____ school days _____ weekends _____

Stress pattern of headache during holiday _____ Eye sight checked _____

History of periodic syndromes

Infancy: colic _____ benign paroxysmal torticollis _____

Toddler: seeking dark room _____ head banging _____

Child: vertigo _____ limb pain _____ abdominal pain _____ cyclical vomiting _____ photophobia _____

phonophobia _____ visual aura _____ sensory aura _____ nausea _____ vomiting _____

dizziness _____ pallor _____ motion sickness _____ anorexia _____

Behavior problems: _____

Sleep history: _____

Sleep Disturbances: _____ bruxism _____ night terrors _____ nightmares _____

apnea _____ snoring _____

Thoracic or low back pain: _____

Table 4. Headache Examination Child 5-16

Evaluation of musculoskeletal dysfunction in children with headache

Postural examination forward head posture _____ kyphosis _____ upper cross syndrome _____

lordosis _____ scoliosis _____ torticollis _____

plagiocephaly _____

Manual joint palpation cervical/costovertebral/thoracic joints _____

cranio-cervical flexion test: _____ flexion-rotation test R: ____ L: ____

active ROM: cervical _____ thoracic _____ lumbar _____

range of motion shoulder joint: R: ____ L: ____ costovertebral joints _____

trigger point palpation cervical/thoracic musculature: _____

TMJ exam with asymmetry or orofacial pain: R: ____ L: ____

eye sight _____ eye tracking _____ accomodation _____ nystagmus _____

Neurological examination

mental Status: interaction with parents _____ following instructions _____

motor function and balance: hop _____ skip _____ jump _____ gait _____

stand on one leg (eyes open): R: ____ L: ____ eyes closed: R: ____ L: ____

finger to nose _____ rapid alternating hand movements: _____

standing eyes shut, feet together, resist gentle push to side : R: ____ L: ____

reflexes: _____

sensation: face _____ arms _____ legs _____

strength: _____ toe walk _____ heel walk _____ walk on toes _____ squeeze fingers _____

Babinski _____

Cranial nerves

CN1: identify specific smell with eyes closed _____

CN2: identify colors _____ numbers _____

CN3, 4, 6: eyes following object through visual field _____ pupillary response _____

CN 5: chewing _____

CN 7: smile, taste _____

CN 8: hearing, balance _____

CN 9: swallowing _____

CN 10: gag, swallow _____

CN 11: shrug shoulder _____

CN 12: stick out tongue _____

References:

1. Porcino A, Solomonian L, Zylich S, Gluvic B, Doucet C, Vohra S. Pediatric training and practice of Canadian chiropractic and naturopathic doctors: a 2004-2014 comparative study. *BMC Complementary and Alternative Medicine*, 2017; 17(1):512. doi: 10.1186/s12906-017-2024-5.

2. Smith N, Mercer V, Firth J, Jandial S, Kinsey K, Light H, Nye A, Rapley T, Foster HE. RightPath: a model of community-based musculoskeletal care for children. *Rheumatology Advances in Practice*. 2020;4 (2). doi: 10.1093/rap/rkaa057.

3. Tsze DS, Ochs JB, Gonzalez AE, Dayan PS. Red flag findings in children with headaches: Prevalence and association with emergency department neuroimaging. *Cephalalgia* 2019;39(2):185-196. doi: 10.1177/0333102418781814.

4. Gawlik A, Such K, Dejner A, Zachurzok A, Antosz A, Malecka-Tendera E. Subclinical hypothyroidism in children and adolescents: is it clinically relevant? *Int J Endocrinol*. 2015:691071. doi: 10.1155/2015/691071. Epub 2015 Mar 29. PMID: 25892992; PMCID: PMC4393928.

5. Zhai YN, Li Y, Wei LQ, Zhang MQ, Lu HQ, Zhang L. Incidences of aortic and mitral valve strands in patients with migraine with aura. Zhongguo Yi Xue Ke Xue Yuan Xue Bao. 2015;37(2):147-51. doi: 10.3881/j.issn.1000-503X.2015.02.003. PMID: 25936701.

6. Zarcone D, Corbetta S. Shared mechanisms of epilepsy, migraine and affective disorders. *Neurol Sci*. 2017;38(Suppl 1):73-76. doi: 10.1007/s10072-017-2902-0. PMID: 28527083.

7. Association of Paediatric Chartered Physiotherapists MSK Specialist Committee, 2019. A Paediatric Musculoskeletal Competence Framework for Physiotherapists Working in the UK. Chartered Society of Physiotherapists: London, England. Available from: https://www.csp.org.uk/system/files/documents/2019-07/the_shoulder_complex.pdf.

8.Weber S. Headaches in children: Part 2 - The changing phenotypes of headaches in children. *JCCP*;2021(20)2.

9. Weber S. Headaches in children: Part 1. The changing phenotypes of migraine headache in infants, children and adolescents. *JCCP*;2021(20)1.

10. Weber S, Miller AS. Chiropractic history and examination forms for the infant, pre-school, and school-aged child. *JCCP*;2021(20)2.

Using whole body vibration in the pediatric population: a primer for the chiropractor

Tracy Barnes DC DICCP CKTI
Private Practice, Louisville KY USA
tabarnes@aol.com

ABSTRACT

Objective: To present a history of whole body vibration (WBV) and survey current literature as it relates to the use of this therapy with children. Clinical relevance for Doctors of Chiropractic who work in the pediatric realm will be noted. **Methods:** Primary source material came from a literature search of PubMed and google scholar. The search focused on whole body vibration therapy in use with children aged 0-18 years with keywords: 'whole body vibration and pediatrics; whole body vibration and children, WBV and pediatrics, WBV and children, WBV contraindications.' **Results:** Based on the results of this review, WBV appears to be safe and well tolerated in the pediatric population. Multiple effects have been found for WBV including decreasing muscle spasticity, improving muscle strength and balance and increasing bone density It has been studied in children diagnosed with a variety of disorders including cerebral palsy, Down syndrome, movement disorders, bone mineral density and more. Appropriate frequency levels for treatment are presented. Contraindications were minimal. **Conclusion:** WBV can safely be introduced to children and may provide positive therapeutic gains.

Key Words: whole body vibration and pediatrics; whole body vibration and children, WBV and pediatrics, WBV and children, WBV contraindications, whole body vibration therapy (WBVT).

Introduction

The use of vibration as therapy goes back to the ancient Greeks and then progresses to various therapies of the 1800's until the use of vibration machines for Russian cosmonauts in the 1970's.[1] In 2022, whole body vibration is a well-researched therapy with possible benefits such as increasing muscle strength, balance and bone mineral density for multiple populations. Today's Doctors of Chiropractic may benefit from understanding and utilizing this therapy for many of their patients from children to the elderly.

History

The ancient Greeks are said to be the first to employ what modern vernacular terms whole body vibration (WBV) therapy. One of the treatments for injured soldiers on battlefields was a bowstring like instrument that was placed over a wound and vibrated when set in motion. Speculation is that this 'treatment' aided the body in moving 'pus' to the surface for release. In addition, "Greek physicians used flutes, lyres, and zithers (harp like instrument) to heal their patients.[1] They used vibration to aid in digestion, treat mental disturbance, and induce sleep. Aristotle (323—373 BCE), in his famous book De Anima, wrote that flute music could arouse strong emotions and purify the soul."[2]

In the 1850's, Dr. Gustav Zander, the father of mechanotherapy from the University of Stockholm is widely reported to have developed machines that moved and vibrated individual body parts as well as the whole body.[3] Zander, a physician, gymnastics teacher and inventor was said to have created some 70 different machines in his lifetime.[3] Among them were chest and body percussive machines, back strengthening machines, scoliosis aids and more. In an age of blood-letting and noxious humors, Zander's treatments were ahead of his time. His mechanical devices served in many cases, as the precursor to modern gym equipment.[4]

French physician and neurologist Jean-Martin Charcot was also using vibration therapy in the 19th century to help his patients.[5] He lectured multiple times about the benefits of vibration for those with neurologic disease including Parkinson's. He is credited with developing the first 'vibration chair.' This invention came about after he began noting that his patients felt better after long rides in carriages or overnight on trains. He reproduced this experience by having his patients sit for 30 minutes in an automated vibratory chair. His junior colleague, Gilles de la Tourette created a helmet that vibrated with the idea that the brain responded positively to pulsation.[5]

Following the lead of Russian scientists who used vibration therapy to treat their cosmonauts' muscle and bone loss while in space, NASA embarked on an investigation of its own to see if vibration could decrease anti-gravity related bone loss.[6] NASA-funded scientists developed a vibratory plate that was used in space flight. Astronauts were held to the plate with elastic straps and could continue some work tasks while exposed to 10 to 20 minutes of vibration (90 Hz).[6] The scientists found that these subtle vibrations slowed bone loss in animal model studies on sheep and

rats. One of the studies showed with only 10 minutes a day of low level vibration could be "an effective biomechanical intervention for the prevention of bone loss that plagues long-term space flight, bed rest, or immobilization caused by paralysis."[7]

What is Whole Body Vibration (WBV)?

The look of vibration therapy machines has changed from the days of Dr Zander's device where the patient stood in front of a gyrating punching bag type device or was seated in Dr. Charcot's oscillating lounge chair. Today's WBV devices are plates, usually made of metal and plastic that provide a high-frequency mechanical stimulus that is transmitted through the body. This vibratory movement loads bone and sensory receptors and can be considered weight-bearing exercise.[8]

The vibration platforms can deliver vibration over a range of frequencies (5-90 Hz) and amplitudes or displacements that are generally termed 'peak to peak' which indicates the lowest and highest positions of movement. Vibrations can also move in a vertical or side to side, oscillating movement. Consensus has not yet shown the optimum combination of all these movements although most research on children follows a 'less is more' idea in terms of frequency and amplitude. Multiple studies assessing WBV in children and adolescents use a 20-30 Hz range intervention.[8] It has been the author's experience that some children are not able to comfortably tolerate higher frequencies and anecdotally have complained of stomach aches when using vibrations above 50 Hz.

Users can adopt a variety of positions on the plate from standing to sitting to placing hands on it. Those who have difficulty with independent standing can make use of a stabilizing bar often mounted on the vibration plate or their feet can be placed on the plate from a standing support. In this way, WBV can be used by a large majority of children who would be seen in a chiropractic office for care. In addition, WBV plates can be used for active exercise and has been shown to be safe as a passive intervention for those with motor impairment or poor balance function.[9]

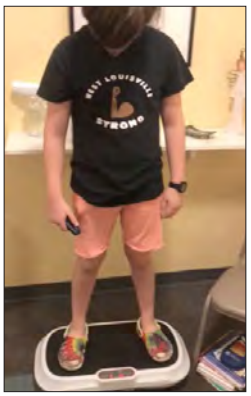
WBV and Bone Mineral Density

Since the earlier days of animal and astronaut studies, hundreds of others have looked at vibration therapy for its use with various populations. In 2020, Swolin-Eide et al published a systematic review in the *Current Osteoporosis Report* looking at vibration therapy specifically for children. Their review of 10 years of research on the use of vibration and bone loss in children showed first and foremost that WBV is a safe modality for children. In fact, no serious side effects had been noted in multiple studies on the use of WBV and children with Duchenne's muscular dystrophy, Down syndrome, cerebral palsy(CP), cystic fibrosis, type 2 diabetes and obesity. They noted that studies of children with CP reported that 80% of the participants experienced redness of the feet after the first treatment session. They also concluded that "WBV appeared to be a safe non-pharmacological anabolic approach to increase bone mass in some pediatric populations" and they called for more research to further evaluate WBV's use.[10] Based on these findings, the author proposes that WBV can safely be used with children in a supervised setting.

While some reviews show WBV to be no better than minimal intervention and note that the quality of some studies on WBV is low,[14] other randomized controlled research shows WBV to improve bone mineral content and density in children with and without Down syndrome (DS).[16] In one study, 26 adolescents (half with DS and half without) aged 12-18 years used a vibration plate 3x/week for approximately 10 minutes at a frequency of 25-30 Hz. After 20 weeks, their study showed clinically relevant gains in bone mineral content of multiple skeletal areas, such as pelvis, legs and spine in both groups of adolescents.[16]

WBV and Muscle Function

The results of the 10-year review also note that WBV shows the most beneficial effect in muscle strength, balance, and walking speed in children affected by "Down syndrome or severe motor disabilities with low bone mass and reduced activity levels."[10] Other studies have indicated a positive effect on muscle cells as well as osteocytes. Research published in the *Medical Sciences and Sports Exercise Journal* compared the effect of WBV versus resistance training in a 12-week program aimed at human knee extension strength. This study involved 67 females who were approximately 21 years of age and randomized into three groups. While one group was control and another did resistance training; the third group performed static and dynamic exercise on a vibration plate set at 35-40 Hz for some 20 minutes, three times per week. Results here were clear that increases in strength that were shown after WBV training was "not attributable to placebo effect."[11]



Rhys, age 13 years old, who suffers from hypertonic hamstrings, uses WBV to help improve his range of motion.

When looking specifically at children, a pilot trial study was published in 2013 aimed at investigating WBV and muscle strength of kids with cystic fibrosis. They used a home-based WBV program for seven children aged eight to 15 years. Parents supervised the children standing on a vibration plate at 20 — 22 Hz for 20 — 30 minutes once per day for four weeks. Outcomes showed no adverse effects and "indicated that WBV may be a potentially effective exercise modality to safely increase leg strength and explosive power in children with CF."[12]

Children with spastic cerebral palsy may benefit from WBV as shown in an 8-week intervention using WBV for 10 minutes at 3x/week. "The results suggested that an 8-week WBV intervention normalized muscle tone, improved active joint range and enhanced ambulatory performance in children with cerebral palsy for at least three days. These indicated that regular WBV can serve as an alternative, safe, and efficient treatment for these children in both clinical and home settings."[19]

The literature review on WBV for children with disabilities that was published in the 2014 *Journal of Adolescent Health* noted that most of the 22 papers they looked at "showed positive effects of WBV on health-related physical fitness in children and adolescents with disabilities. Overall, 10-20 minutes at least three times per week, for a minimum of 26 weeks, with frequencies between 15 and 35 Hz might be an appropriate protocol to achieve improvement in body composition and muscular strength."[8]

A 2019 pilot study out of China looked at the effects of WBV on lumbar and abdominal activation in healthy young adults aged approximately 21 years. They used surface electromyography (sEMG) to measure actions of multifidi, rectus abdominis, erector spinae and abdominal oblique muscles with multiple frequencies of vibration. Their findings support the use of 15 Hz vibration as the "best vibration stimulation for core muscles in all of the exercises."[13] A 2018 literature review of 24 studies on WBV's effect on neuromuscular performance concluded that WBV "can bring about improvement in muscles strength, power, and flexibility."[15]

WBV and Other Benefits

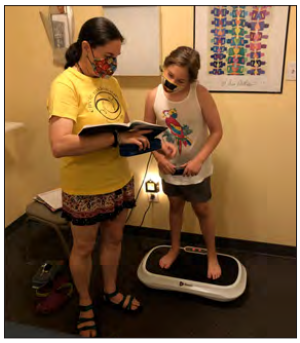
Not only does WBV seem to have benefits for the neuromuscular and osseous systems, but other studies have looked at the benefits for WBV on cognition. (See Table 1). Fifty-five healthy children aged 8 to 13 years participated in a study where they sat in a chair that was mounted to a vibration plate. They sat for one to three sessions of three minutes each at a frequency of 30 Hz. Researchers used performance tools to analyze inhibition as a function of attention before and after the children were exposed to the vibration. They concluded that WBV improves inhibition in healthy children and recommended more studies for children diagnosed with ADHD.[17] There is one study available that followed an adult with ADHD for 10 consecutive days using WBV as a treatment modality. Post neuropsychological assessments revealed a 'high clinical value' in the use of WBV for those with impairments such as ADHD.[18]

Research shows WBV may be useful for those with:
Muscle spasticity[23]
Bone mineral deficiency[10]
Impaired muscle performance[12,16]
Athletic performance[17,26]
Balance issues[13]
Proprioception deficit[13]
ADHD[19]
Cognitive dysfunction[18]
Restless legs[27]
Fatigue[28]
Pediatric cancers[29]
Cerebral palsy[14,15]

Table 1.

Contraindications for WBV use

Reports of adverse effects of WBV use with children, are difficult to find. As previously mentioned, one study found that the children with CP that used WBV experienced some redness of the feet.[10] Certainly caution is warranted when using WBV in children who may have balance issues, are diagnosed with epilepsy or seizure disorders or who have had recent surgeries. WBV machines are available that have bracing bars attached to their base and should be used with any child whose balance is in question. Clinicians should also take care to provide support as needed in all uses of WBV. This author recommends placing the vibration plate in reach of a stable piece of furniture or walker if available



Gordon, age 10 years old, is able to successfully read and continue home-school work while using WBV therapy.

and never allowing children with balance issues to use the device unattended. More study is needed in areas of understanding the most beneficial frequency, timing and amplitude of the vibration. Additional research is also needed in clarifying the mechanism of action of WBV on the body and which bodily systems are stimulated by its use.

Matute-Llorente, et al. say in their conclusion that: "Because no serious adverse events have been observed, WBV might be defined as a safe treatment to be applied in children and adolescents with disabling conditions. Further research is recommended to explore the minimum dose of exposure to WBV required to elicit an optimal response in children and adolescents for improving health-related physical fitness. These may be translated into a more specific WBV protocol."[8]

A systematic review of WBV use for children with cerebral palsy done by Saquetto et al notes, "Overall, whole-body vibration seems to be well tolerated among children with cerebral palsy, although the incidence of long-term hazards requires more research."[24]

WBV in the Chiropractic Setting

As a Doctor of Chiropractic with a specialty emphasis in pediatrics, this author uses WBV platforms in her office on a daily basis. In the waiting room, multiple vibration plates are available for patients of all ages to place their feet on or stand on. During treatments when more than one patient in a family is in the treatment room, those not receiving hands-on care can stand, sit or place feet on a vibration platform. This is especially helpful in cases where one young person needs a calming stimulus prior to their treatment. Experience has shown that kids of all ages enjoy using the vibration plates. Many have purchased plates for use at home and have found them useful to place feet on when studying, after sports or prior to bedtime.

Vibration plates can be found for sale in multiple places online and range from approximately $100 to over $1,000. The author's experience has been that vibration plates of good quality are available for $150-$200 and are useful for families to have at home for daily use. When looking to buy a vibration machine, it is recommended to assure the weight limit is appropriate to the patient. Some WBV plates have an upper weight limit of 250lb. Also of importance is assuring that those with balance issues or decreased proprioception have someone or something nearby to assist with fall prevention. And in starting a WBV program, studies recommend starting with a low Hz setting and spending no more than 10 minutes on a plate per day to begin with.

Michael, age 9 years old, tried to do a somersault on a trampoline prior to this visit for treatment of neck to midback pain. He says the vibration plate is 'super relaxing.'

Conclusion

Based on available research, implementing the use of a WBV plate can be a beneficial adjunct to a Doctor of Chiropractic's office for children as well as adult patients. There are a plethora of children with diagnoses ranging from Down syndrome to cerebral palsy to cancer and more who could benefit from this therapy. Chiropractors who specialize in the care of children may be asked by families if this therapy can help their child. This paper seeks to provide information to address those questions with knowledge. As with many treatment modalities, more high quality research is needed to better understand the uses of WBV.

References:

1. Chambers B. *Whole Body Vibration*. Quartet Books. Charlottsville, VA. 2013.

2. Assad, M. Music, Medicine, Healing and the Genome Project. *Psychiatry* (Edgmont), 2009 Sep; 6(9): 43—45.

3. Fishchingers. Doctor Zander's Medico-Mechanical Institute in Opatija. *Acta Med w Hist Adriat*, 2009;7(2):253-66.

4. Naples R. Dr. G. Zander's Medico-mechanical Gymnastics. Smithsonian Magazine. Unbound blog. Jan 6, 2016.

5. Goetz, C G. Jean-Martin Charcot and his vibratory chair for Parkinson disease. *Neurology*, 2009; Aug 11;73(6):475-8.

6. Good Vibrations. NASA Science publication. 2001, Nov. 2. //science.nasa.gov/science-news/science-at-nasa/2001/ast02nov_1.

7. Clinton R, Xu G, Judex S. The anabolic activity of bone tissue, suppressed by disuse, is normalized by brief exposure to extremely low-magnitude mechanical stimuli. *FASEB* Jo. 2001. Oct; 15(12):2225-9.

8. Matute-Llorente A, Gonzalex-Aguero A, Gomez-Cabello A, Vicente-Rodriguez G, Antonio Casajus Mallen J. Effect of whole-body vibration therapy on health-related physical fitness in children and adolescents with disabilities: a systematic review. *J Adolesc Health*.2014 Apr;54(4):385-96.

9. Li K, Cho Y. The Effect of Whole-Body Vibration on Proprioception and Motor Function for Individuals with Moderate Parkinson Disease: A Single-Blind Randomized Controlled Trial. *Occupational Therapy Int'l*. 2021. Dec 7: 1-9. Article ID 9441366.

10. Swolin-Eide D, Magnusson P. Does Whole-Body Vibration Treatment Make Children's Bones Stronger? *Curr Osteoporos Rep.* 2020; 18(5): 471-479.

11. Matute-Llorente A, Gomez-Cabello A, Tous-Fajardo J, Vicente-Rodriguez G, Casajus J A. Effect of whole-body vibration training on bone mass in adolescents with and without Down syndrome: a randomized controlled trial. *Osteoporos Int*. 2016 Jan;27(1): 181-91.

12. Delecluse C, Roelants M, Verschueren S. Strength increase after whole-body vibration compared with resistance training. *Med Sci Sports Exerc*. 2003; June; 35(6):1033-41.

13. O'Keefe K, Orr R, Huang P, Selvadurai H, Cooper P, Munns C F, Fiatarone Singh M A. The effect of whole body vibration exposure on muscle function in children with cystic fibrosis. *J Clin Med Res*. 2013; June; 5(3):205-16.

14. Cheng HK, Yu Y-C, Wong M-K, Tsai Y-S, Ju Y-Y. Effects of an eight-week whole body vibration on lower extremity muscle tone and function in children with cerebral palsy. *Res in Dev Dis*. 2015 March, 38, 256-261.

15. Gusso S, Munns CF, Colle P, Derraik JGB, Biggs JB, Cutfield WS, Hofman PL. Effects of whole-body vibration training on physical function, bone and muscle mass in adolescents and young adults with cerebral palsy. *Scientific reports* 6.1 (2016): 1-7.

16. Alam M, Khan A, Farooq M. Effect of whole-body vibration on neuromuscular performance: A literature review. *Work*. 2018; 59(4):571-583.

17. Chen B, Dong Y, Guo JB, Zheng YL, Zhang, J, Wang X. Effects of Whole-Body Vibration on Lumbar-Abdominal Muscles Activation in Healthy Young Adults: A Pilot Study. *Med Sci Monit*. 2019; 25: 1945-1951.

18. Heijer A et al. Acute Effects of Whole Body Vibration on Inhibition in Healthy Children. PloS One. 2015 Nov 2; 10(11) e0140665. Published online.

19. Fuermaier ABM, Tucha L, Koerts J. et al. Whole-body vibration improves cognitive functions of an adult with ADHD. *ADHD Atten Def Hyp Disord* 2014, 6, 211-220

20. Saquetto M, Carvalho V, Silva C, Conceicao C, Gomes-Neto M.The effects of whole body vibration on mobility and balance in children with cerebral palsy: a systematic review with meta-analysis. 2015 *J Musculoskelet Neuronal Interact*. Jun; 15(2): 137—144.

21. Leite HR, Resende Camargos AC, Mendonca VA, Rodrigues Lacerda AC, Soares BA, Oliveira VC. Current evidence does not support whole body vibration in clinical practice in children and adolescents with disabilities: a systematic review of randomized controlled trial. 2019 *Braz J Phys Ther*. May-Jun; 23(3): 196—211.

22. Monteleone G, DeLorenzo A, Sgroi M, DeAngelis S, DiRenzo L. Contraindications for whole body vibration training: a case of nephrolitiasis. *J Sports Med Phys Fitness*. 2007 Dec; 47(4):443-5.

23. Huang, Meizhen, Lin-Rong Liao, and Marco YC Pang. "Effects of whole body vibration on muscle spasticity for people with central nervous system disorders: a systematic review." *Clinical Rehabilitation* 31.1 (2017): 23-33.

24. Wunram HL, Hamacher S, Hellmich M, Volk M, Janicke F, Reinhard F, Bloch W, Zimmer P, Graf C, Schonau E, Lehmkuhl G, Bender S, Fricke O. Whole body vibration added to treatment as usual is effective in adolescents with depression: a partly randomized, three-armed clinical trial in inpatients. *European Child & Adolescent Psychiatry* 27.5 (2018): 645-662.

25. Vesey RM, Hofman PL, Derraik JGB, Colle P, Biggs JB, Munns CF, Cutfield WS, Gusso S. Safety, feasibility and efficacy of side-alternating vibration therapy on bone and muscle health in children and adolescents with musculoskeletal disorders: A pilot trial." *Journal of Paediatrics and Child Health* 56.8 (2020): 1257-1262.

26. Beerse M, Lelko M, Wu J. "Acute effect of whole-body vibration on acceleration transmission and jumping performance in children." *Clinical Biomechanics* 81 (2021): 105235.

27. Mitchell U, Hilton SC, PhD, Hunsaker E, Ulfberg J, MD, PhD. Decreased Symptoms without Augmented Skin Blood Flow in Subjects with RLS/WED after Vibration Treatment *JCSM*, 2016 12(7):947-952.

28. Alentero-Geli E, Padilla J, Moras G, Lazaro Haro C, Fernandez-Sola J. Six weeks of whole-body vibration exercise improves pain and fatigue in women with fibromyalgia. *J Altern Complement Med* 2008 Oct; 14(8):975-81.

29. Rustler V, Daggelmann J, Streckmann F, Bloch W, Baumann FT. Whole-body vibration in children with disabilities demonstrates therapeutic potentials for pediatric cancer populations: a systematic review. 2019 *Support Care Cancer* 27: 395—406.

JOURNAL ABSTRACTS

Click on the icon to read the full abstract or article.

Evidence-Informed Milestones for Developmental Surveillance Tools
Jennifer M. Zubler, MD, Lisa D. Wiggins, PhD, Michelle M. Macias, MD, Toni M. Whitaker, MD, Judith S. Shaw, EdD, MPH, RN, Jane K. Squires, PhD, Julie A. Pajek, PhD, Rebecca B. Wolf, MA, Karnesha S. Slaughter, MPH, Amber S. Broughton, MPH, Krysta L. Gerndt, MPH, Bethany J. Mlodoch, Paul H. Lipkin, MD.
Pediatrics (2022) 149 (3): e2021052138.
https://doi.org/10.1542/peds.2021-052138

The Centers for Disease Control and Prevention's (CDC) Learn the Signs Act Early program, funded the American Academy of Pediatrics (AAP) to convene an expert working group to revise its developmental surveillance checklists. The goals of the group were to identify evidence-informed milestones to include in CDC checklists, clarify when most children can be expected to reach a milestone (to discourage a wait-and-see approach), and support clinical judgment regarding screening between recommended ages. Subject matter experts identified by the AAP established 11 criteria for CDC milestone checklists, including using milestones most children (≥75%) would be expected to achieve by specific health supervision visit ages and those that are easily observed in natural settings. A database of normative data for individual milestones, common screening and evaluation tools, and published clinical opinion was created to inform revisions. Application of the criteria established by the AAP working group and adding milestones for the 15- and 30-month health supervision visits resulted in a 26.4% reduction and 40.9% replacement of previous CDC milestones. One-third of the retained milestones were transferred to different ages; 67.7% of those transferred were moved to older ages. Approximately 80% of the final milestones had normative data from ≥1 sources. Social-emotional and cognitive milestones had the least normative data. These criteria and revised checklists can be used to support developmental surveillance, clinical judgment regarding additional developmental screening, and research in developmental surveillance processes. Gaps in developmental data were identified particularly for socialemotional and cognitive milestones.

Comparison of Pelvic Floor Muscle Training With Connective Tissue Massage to Pelvic Floor Muscle Training Alone in Women With Overactive Bladder: A Randomized Controlled Study
Yasemin Karaaslan, Seyda Toprak Celenay, Faruk Kucukdurmaz
Journal of Manipulative and Physiological Therapeutics 2021, 44 (4): 295-306
DOI: http.//doi.org/10.1016/jmpt.2021.02.001

OBJECTIVE: The purpose of this study was to compare the effects of a 6-week program of pelvic floor muscle training (PFMT) plus connective tissue massage (CTM) to PFMT alone in women with overactive bladder (OAB) symptoms on those symptoms, pelvic floor muscle strength, and quality of life. RESULTS: In both groups, pelvic floor muscle strength increased, whereas OAB symptoms and PPIUS and KHQ scores decreased after treatment ($P < .05$). Although the OAB-V8, PPIUS, and KHQ scores decreased at week 3, frequency, OAB-V8, and PPIUS scores, in addition to some parameters of the KHQ, decreased after treatment in the PFMT+CTM group compared to the PFMT group ($P < .05$). CONCLUSION: Compared to PFMT alone, PFMT+CTM achieved superior outcomes in reducing OAB symptoms in the early and late periods.

Chiropractic Care for the Pregnant Body
Shayna N Conner, Amanda S Trudell, Craig A Conner
PMID: 33882524 DOI: 10.1097/GRF.0000000000000621

Chiropractic care is a commonly used treatment modality for musculoskeletal pain in pregnancy. Low back pain, pelvic pain, and other neuromuscular complaints are prevalent in pregnancy and contribute to significant maternal discomfort in many women. Nonpharmacologic therapies to relieve pain are increasingly important during pregnancy because of the opioid epidemic. Chiropractic treatment is one of the potential therapies that offers intervention without medications. This article provides an evidence-based review of the epidemiology of chiropractic use in obstetrics, commonly treated conditions, related physiology of pregnancy, and safety of spinal manipulation.

Identifying potential treatment effect modifiers of the effectiveness of chiropractic care to infants with colic through prespecified secondary analyses of a randomised controlled trial
Lise Vilstrup Holm, Werner Vach, Dorte Ejg Jarbøl, Henrik Wulff Christensen, Jens Søndergaard, Lise Hestbæk
Chiropractic & Manual Therapies 2021 April 19, 29 (1): 16

DOI: https://doi.org/10.1186/s12998-021-00373-6

A recent trial identified large variation in effect of chiropractic care for infantile colic. Thus, identification of possible effect modifiers could potentially enhance the clinical reasoning to select infants with excessive crying for chiropractic care. Therefore, the aim of this study is to identify potential treatment effect modifiers which might influence the effect of chiropractic care for excessive crying in infancy.

The effect of chiropractic care on infantile colic: results from a single-blind randomised controlled trial
Lise Vilstrup Holm, Dorte Ejg Jarbøl, Henrik Wulff Christensen, Jens Søndergaard, Lise Hestbæk
Chiropractic & Manual Therapies 2021 April 19, 29 (1): 15
https://chiromt.biomedcentral.com/track/pdf/10.1186/s12998-021-00371-8.pdf

This is a multicenter, single-blind randomized controlled trial conducted in four Danish chiropractic clinics, 2015-2019. Information was distributed in the maternity wards and by maternal and child health nurses. Children aged 2-14 weeks with unexplained excessive crying were recruited through home visits and randomized (1:1) to either chiropractic care or control group. Both groups attended the chiropractic clinic twice a week for 2 weeks. The intervention group received chiropractic care, while the control group was not treated. The parents were not present in the treatment room and unaware of their child's allocation. The primary outcome was change in daily hours of crying before and after treatment. Secondary outcomes were changes in hours of sleep, hours being awake and content, gastrointestinal symptoms, colic status and satisfaction. All outcomes were based on parental diaries and a final questionnaire.

Is foot reflexology effective in reducing colic symptoms in infants: A randomized placebo-controlled trial
Nimet Karatas, Aysegul Isler Dalgic
Complementary Therapies in Medicine, Volume 59, 2021, 102732, ISSN 0965-2299
https://doi.org/10.1016/j.ctim.2021.102732.

Infantile colic and its accompanying crying represent a major source of stress and have negative physiological, emotional and psychological effects on infants and parents. The aim of this study was to examine the efficacy of foot reflexology for reducing symptoms of infantile colic. The study was conducted as a single-blind, randomized, placebo-controlled trial with a sample population of 45 infants diagnosed with infantile colic.

Dietary modifications for infantile colic
Morris Gordon, Elena Biagioli, Miriam Sorrenti, Carla Lingua, Lorenzo Moja, Shel Sc Banks, Simone Ceratto, Francesco Savino
Cochrane Database of Systematic Reviews 2018 October 10, 10: CD011029
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6394439/pdf/CD011029.pdf

Infantile colic is typically defined as full-force crying for at least three hours per day, on at least three days per week, for at least three weeks. This condition appears to be more frequent in the first six weeks of life (prevalence range of 17% to 25%), depending on the specific location reported and definitions used, and it usually resolves by three months of age. The aetiopathogenesis of infantile colic is unclear but most likely multifactorial. A number of psychological, behavioural and biological components (food hypersensitivity, allergy or both; gut microflora and dysmotility) are thought to contribute to its manifestation. The role of diet as a component in infantile colic remains controversial. OBJECTIVES: To assess the effects of dietary modifications for reducing colic in infants less than four months of age.

Non-pharmacologic approach to pediatric constipation
Neha R Santucci, Ashish Chogle, Alycia Leiby, Maria Mascarenhas, Rachel E Borlack, Amanda Lee, Maria Perez, Alexandra Russell, Ann Ming Yeh
Complementary Therapies in Medicine 2021, 59: 102711
https://doi.org/10.1016/j.ctim.2021.102711

Functional constipation (FC) is a pervasive problem in pediatrics. Although pharmaceuticals are commonly used for FC, parents and patients show reluctance or find dissatisfaction with available medications at times. Further, patients often have interest in utilizing nutraceutical supplements and botanicals that are available over the counter. This literature review aims to summarize research studies performed on non-pharmacologic approaches to constipation and to evaluate the safety and efficacy of these modalities. Overall data on non-pharmacologic treatments for childhood constipation were sparse, and though some studies were available for adult populations, pediatrics studies were generally limited, lacking or flawed. Certain supplements, such as prebiotics, probiotics and fiber, are safe and are without significant side effects. Though fiber supplements such as glucomannan, green banana mass, cocao husk and various fiber blends have emerging evidence in children, evidence for psyllium, cellulose and flaxseed only have supportive studies in adults. Other than senna, studies of botanicals indicate significant safety concerns (in particular with Aloe vera with aloin and Cascara sagrada) and insufficient evidence. For patients with a significant behavioral or anxiety component to their FC and exhibit dyssynergia, mind-body interventions (e.g. diaphragmatic breathing, biofeedback, cognitive behavioral therapy, and behavioral modifications) are certainly safe and effective. Finally, movement and manipulative interventions such as abdominal massage, reflexology, acupuncture and transcutaneous nerve stimulation show promise in the field of pediatric constipation, and data is accumulating for efficacy.

JOURNAL ABSTRACTS

Click on the icon to read the full abstract or article.

Clinical efficacy and safety of acupuncture treatment of TIC disorder in children: A systematic review and meta-analysis of 22 randomized controlled trials
Chen Lu, Li-qun Wu, Hongwen Hao, Xinting Kimberly Leow, Fang-wei Xu, Pan-pan Li, Dong-sheng Wang,
Complementary Therapies in Medicine, Volume 59, 2021, 102734, ISSN 0965-2299,
https://doi.org/10.1016/j.ctim.2021.102734.

To systematically evaluate the clinical efficacy and safety of acupuncture in the treatment of Tic Disorders (TD) in children, and to clarify the current evidence regarding the clinical application of acupuncture in the treatment of TD. Randomized controlled trials (RCTs) comparing acupuncture treatment with pharmaceutical treatment for TD were included in this review. Conclusion: Acupuncture treatment alone is more effective in the treatment of TD than pharmaceutical treatment, as seen in the reduction of YGTSS scores, fewer adverse effects and lower recurrence rates.

Effectiveness of chiropractic manipulation versus sham manipulation for recurrent headaches in children aged 7-14 years - a randomised clinical trial
Susanne Lynge, Kristina Boe Dissing, Werner Vach, Henrik Wulff Christensen, Lise Hestbaek
Chiropractic & Manual Therapies 2021 January 7, 29 (1): 1
DOI: https://doi.org/10.1186/s12998-020-00360-3

To investigate the effectiveness of chiropractic spinal manipulation versus sham manipulation in children aged 7-14 with recurrent headaches. RESULTS: Chiropractic spinal manipulation resulted in significantly fewer days with headaches (reduction of 0.81 vs. 0.41, p = 0.019, NNT = 7 for 20% improvement) and better global perceived effect (dichotomized into improved/not improved, OR = 2.8 (95% CI: 1.5-5.3), NNT = 5) compared with a sham manipulation procedure. There was no difference between groups for pain intensity during headache episodes. Due to methodological shortcomings, no conclusions could be drawn about medication use.

Physical activity and low back pain in children and adolescents: a systematic review
Agnieszka Kedra, Magdalena Plandowska, Przemyslaw Kedra, Dariusz Czaprowski
European Spine Journal 2021, 30 (4): 946-956
https://link.springer.com/content/pdf/10.1007/s00586-020-06575-5.pdf

Due to a high prevalence of low back pain (LBP) among children and adolescents, it is significant to seek effective prevention and therapeutic procedures. One idea for the programmes is a potential relation between the occurrence of LBP and the level of physical activity. The aim of this review was to analyse the current knowledge regarding the association between physical activity and LBP among children and adolescents. CONCLUSION: There is moderate evidence for the association between physical activity and LBP in children and adolescents. The results highlight the need for continued research. It seems that for clear evaluation of the analysed association the prospective cohort studies should be conducted.

Diagnosis and Management of Hypermobility Spectrum Disorders in Primary Care
Karina Atwell, William Michael, Jared Dubey, Sarah James, Andrea Martonffy, Scott Anderson, Nathan Rudin, Sarina Schrager
PMID: 34312277 DOI: 10.3122/jabfm.2021.04.200374

Hypermobility spectrum disorders (HSDs) encompass an array of connective tissue disorders characterized by joint instability and chronic pain. Fatigue and other systemic symptoms that affect daily functioning may occur, as well. Accurate data on incidence and prevalence of HSDs is hampered by lack of awareness of these conditions and the wide heterogeneity of their clinical presentation. Identifying which type of HSD is present is important in guiding appropriate care. In particular, making the diagnosis of hypermobile Ehlers-Danlos syndrome (hEDS) is important, as individuals with hEDS may be at risk for more significant multisystem involvement. Diagnostic criteria for hEDS include measures of joint hypermobility, skin and other connective tissue findings, and lack of evidence of a different type of Ehlers-Danlos syndrome. Beyond accurate diagnosis, HSDs pose many challenges for primary care providers, as ongoing patient education, patient empowerment, and coordination of a multidisciplinary treatment team are integral to proper care. This article describes the incidence and prevalence, pathophysiology, diagnosis, and management of HSDs, including clinical cases exemplifying how joint hypermobility might present within a primary care setting.

Click on the icon to read the full abstract or article.

The safety of spinal manipulative therapy in children under 10 years: a rapid review

Melissa Corso, Carol Cancelliere, Silvano Mior, Anne Taylor-Vaisey, Pierre Côté
PMID: 32093727 PMCID: PMC7041232 DOI: 10.1186/s12998-020-0299-y

The safety of spinal manipulative therapy (SMT) in children is controversial. We were mandated by the College of Chiropractors of British Columbia to review the evidence on this issue. We conducted a rapid review of the safety of SMT in children (< 10 years). We aimed to: 1) describe adverse events; 2) report the incidence of adverse events; and 3) determine whether SMT increases the risk of adverse events compared to other interventions. Conclusion: The risk of moderate and severe adverse events is unknown in children treated with SMT. It is unclear whether SMT increases the risk of adverse events in children < 10 years.