

OFP

Osteopathic Family Physician

THE OFFICIAL PEER-REVIEWED
PUBLICATION OF THE AMERICAN
COLLEGE OF OSTEOPATHIC
FAMILY PHYSICIANS

MARCH | APRIL 2022

Volume 14 | Number 2
ofpjournal.com

EDITOR'S MESSAGE

Food for Thought

FROM THE PRESIDENT'S DESK

The Pillars of ACOFP: A Retrospective
on the Presidency

RESEARCH ARTICLE

Osteopathic Manipulative Treatment
for Sinusitis Relief: A Pilot Study

REVIEW ARTICLES

Osteopathic Manipulative Treatment for
Sinusitis Relief: A Pilot Study

Troubleshooting Common Breastfeeding
Difficulties

Osteoarthritis Disease Progression
Through the Lower Extremity:
A Literature Review

BRIEF REPORT

Generational Differences in
Communication and Their Translation
to Medical Education

CLINICAL IMAGE

Seizure Induced Thoracocervicofacial
Petechiae

PATIENT EDUCATION HANDOUT

Joint Injections



acofp | AMERICAN COLLEGE
OF OSTEOPATHIC
FAMILY PHYSICIANS

www.acofp.org

COMPREHENSIVE CARE FOR PERSONS WITH DIABETES: A CERTIFICATE PROGRAM



LEARN INNOVATIVE APPROACHES TO DIABETES CARE
AND IMPROVE PATIENT OUTCOMES WITH **COMPREHENSIVE CARE**
FOR PERSONS WITH DIABETES: A CERTIFICATE PROGRAM.



Centered around 12 interactive, online modules available on-demand that cover the full span of diabetes care



Provides a certificate of course completion after passing comprehensive final exam



Built by experts from diverse backgrounds spanning endocrinology, nursing, and family medicine



Accredited for AMA PRA Category 1 credits, AOA Category 1-A CME credits, ANCC/COA credits, AAPA credits, and ABIM MOC points

FOR MORE INFORMATION AND TO REGISTER, PLEASE VISIT ACOFP.ORG/DIABETESCERT.



Guide for

READERS

Osteopathic Family Physician (ISSN 1877-573X) is published bimonthly by the American College of Osteopathic Family Physicians. Postage paid at Arlington Heights, IL, and additional mailing offices.

USA POSTMASTER

Send address changes to:

American College of Osteopathic Family Physicians
Membership Department:

330 E. Algonquin Rd., Ste. 1
Arlington Heights, IL, 60005

CUSTOMER SERVICE

(orders, claims, online, change of address)

American College of Osteopathic Family Physicians

330 E. Algonquin Rd., Ste. 1
Arlington Heights, IL 60005

847-952-5100 | membership@acofp.org

YEARLY SUBSCRIPTION RATES

United States & Possessions:

Individual \$116 | Institution \$208 | Student \$57

All other countries: (prices include airspeed delivery)

Individual \$146 | Institution \$267 | Student \$74
Single issues \$42

To receive student rate, orders must be accompanied by name of affiliated institution, date of term and signature of program coordinator on institution letterhead. Orders will be billed at the individual rate until proof of status is received. Current prices are in effect for back volumes and back issues.

ADVERTISING INFORMATION:

Advertising orders and inquiries can be sent to:

Matt Van Wie
804-550-2312 | matt@esvw.com

AUTHOR INQUIRIES

For inquiries relating to the submission of articles (including electronic submission), please visit www.ofpjournal.com.

Content details for questions arising after acceptance of an article, especially those relating to proofs, will be provided by the publisher.

You can track accepted articles and view Author Guidelines through Scholar One at mc04.manuscriptcentral.com/ofp.

AUTHORS

For a full and complete Guide for Authors, please go to: mc04.manuscriptcentral.com/ofp.

REPRINTS:

For queries about author reprints, or to order 100 or more reprints for education, commercial or promotional use, contact ACOFP at 847-952-5100 or email gracea@acofp.org.

This journal and the individual contributions contained in it are protected under copyright by ACOFP. The following terms and conditions apply:

PHOTOCOPYING

Single photocopies of single articles may be made for personal use as allowed by national copyright laws. Permission of the Publisher and payment of a fee is required for all other photocopying, including multiple or systematic copying, copying for advertising or promotional purposes, resale, and all forms of document delivery. Special rates are available for educational institutions that wish to make photocopies for non-profit educational classroom use.

Permission may be sought directly from ACOFP: 847-952-5100 | membership@acofp.org

DERIVATIVE WORKS

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for all other derivative works, including compilations and translations.

ELECTRONIC STORAGE OR USAGE

Permission of the Publisher is required to store or use electronically any material contained in this journal, including an article or part of an article.

Except as outlined above, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without written permission of the Publisher.

Address permission requests to ACOFP: 847-952-5100 | membership@acofp.org

NOTICE

No responsibility is assumed by ACOFP for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein. Because of rapid advances in the medical sciences, in particular, independent verification of diagnoses and drug doses should be made.

Although all advertising materials are expected to conform to ethical (medical) standards, inclusion in the publication does not constitute a guarantee or endorsement of the quality of value of such product or of the claims made of it by its manufacturer.

The paper used in this publication meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).



Osteopathic Family Physician

The Official Peer-Reviewed Publication of the
American College of Osteopathic Family Physicians

BOARD OF GOVERNORS

PRESIDENT

Nicole Heath Bixler, DO, MBA, FACOFP

PRESIDENT-ELECT

Bruce R. Williams, DO, FACOFP

VICE PRESIDENT

David J. Park, DO, FACOFP, FAAFP

SECRETARY/TREASURER

Brian A. Kessler, DO, FACOFP

IMMEDIATE PAST PRESIDENT

Robert C. DeLuca, DO, FACOFP *dist.*

PAST PRESIDENT

Duane G. Koehler, DO, FACOFP *dist.*

GOVERNORS

Greg D. Cohen, DO, FACOFP *dist.*

David A. Connett, DO, FACOFP *dist.*

Gautam J. Desai, DO, FACOFP *dist.*

Rebecca D. Lewis, DO, FACOFP

Saroj Misra, DO, FACOFP

Derrick J. Sorweide, DO, FACOFP

RESIDENT GOVERNOR

Rachael A. Hume, DO, MPH

STUDENT GOVERNOR

James Wyatt Eikermann, OMS-IV

SPEAKER

Elizabeth A. Palmarozzi, DO, FACOFP

VICE SPEAKER

Antonios J. Tsompanidis, DO, FACOFP

EXECUTIVE DIRECTOR

Bob Moore, MA, CAE

EDITORIAL COMMITTEE

EDITOR

Ronald Januchowski, DO, FACOFP

Associate Dean for Curriculum, VCOM Carolinas Campus, Spartanburg, SC

ASSOCIATE EDITOR

Paula Gregory, DO, MBA, CHCQM, FAIHQ, FACOFP

Family Practice, The Villages, FL

MEMBERS

Amy J. Keenum, DO, PharmD, *Chair*

Family & Community Medicine, Michigan State University, East Lansing, MI

David Buford, PhD, OMS-III

William Carey University College of Osteopathic Medicine, Hattiesburg, MS

Ryan Christensen, DO

Family Medicine Residency Director & Director of Osteopathic Education

Authority Health /Detroit Wayne County Health Authority, Detroit, MI

Philip Collins, DO

Rowan University School of Osteopathic Medicine, Stratford, NJ

Tyler C. Cymet, DO, FACOFP

Chief of Clinical Education, American Association of Colleges of Osteopathic Medicine, Chevy Chase, MD

Douglas W. Harley, DO, FACOFP, FAAFP

Program Director, Cleveland Clinic Akron General Family Medicine Residency, Akron, OH

Anthony S. Leazzo, DO

Concentra, Aurora, IL

Sarah E. Mitchell, DO

Cleveland Clinic Florida, Wellington, FL

Jon S. Parham, DO

Program Director/Director of Med Ed, LMU-DeBusk -

The University of Tennessee Graduate School of Medicine, TN

Chris Pitsch, DO

Jefferson Health-Jefferson Torresdale Hospital, Philadelphia, PA

Wayne J. Reynolds, DO

Family Medicine, Sentara Medical Group, Gloucester, VA

Lindsay Tjiattas-Saleski, DO, MBA, FACOEP

Emergency Department, Palmetto Health Tuomey, Sumter, SC

Abraham Wheeler

Librarian, Michigan State Libraries, East Lansing, MI

RESIDENT MEMBERS

Ravnit Bhatia, DO

Rowan University School of Osteopathic Medicine, Stratford, NJ

Omar Bukhari, DO

University of Pittsburgh Medical Center, Altoona, PA

Jordan Wong, DO

Campbell University, Sampson Regional Medical Center, Clinton, NC

EMERITUS MEMBER

Merideth Norris, DO, FACOFP

Grateful Recovery, Kennebunk, ME

DEPARTMENT CHAIR

David Connett, DO, FACOFP *dist.*

Western University of Health Sciences – College of Osteopathic Medicine of the Pacific, Pomona, CA

MANAGING EDITOR

Grace Johnson Adams

ACOFP, Arlington Heights, IL

OSTEOPATHIC FAMILY PHYSICIAN SPECIALTY PEER REVIEWERS

Nazem Abdelfattah, DO
Family Medicine

Jeffrey Benseler, DO
Radiology

Franklin Berkey, DO, FAAFP
Cancer, Cardiovascular, Hospice and Palliative Care, GME

Shagun Bindlish, MD
Diabetes and Endocrinology

Raj Brar, DO
Behavioral Health, Family Medicine, Geriatrics, OMT, Pain Management, Pediatrics

Natasha Bray, DO
Ethics

Mohammad Bukhari, DO
Family Medicine, Obstetrics

Janis Coffin, DO
Practice Management

Andrew Crow, DO
Academic, Emergency, Hospital Care, Military

Daniel Jason Frasca, DO
Behavioral Health, Addiction Medicine, Nutrition, Hypertension, Renal Disorders

Ron Grubb, DO
Diabetes, Sports Medicine

Steve Kamajian, DO, CMD, FACOFP
Family Medicine, Geriatrics, Long Term Care

Frank Komara, DO, FACOFP
Geriatrics

Mana Lazzaroto, DO
Clinical Images

Ehab Mady, DO
Vascular

Donald Morgan, DO
Family Medicine

Marjan Moghaddam, DO
Family Medicine

Jon Parham, DO
Preventive Medicine, Pulmonary, Public Health, Geriatrics, Medical Errors

Nicholas Pennings, DO, FOMA
Obesity

Raena Pettitt, DO
Disease Prevention & Wellness

Kim Pfothenauer, DO
Diabetes

M. Jay Porcelli, DO, MEd, PhD, FACOFP *dist.*
Pain Management

Jill Yurko Porter, DO
Obesity, OMT, Physician Wellness and Women's Health

Chad Richmond, DO
Emergency, Family Medicine, Outpatient

Bernadette Riley, DO, FACOFP
Medical Education, Academic, Simulation Medicine, Physician Leadership, Health Policy

Mark Rogers, DO, MA, CAQSM, FAAFP
Family Medicine, Sports Medicine, OMM, Medical Ethics

Kary Schroyer, DO
Direct Primary Care

Christopher Scuderi, DO
Family Practice, Practice Management

Leslie Sleuwen, MD
Community Medicine

Johnathon Torres, DO, FACOFP
OMM

Chad Uptigrove, DO
OMM Obstetrics, Residency Training

Julian Vega, DO
Clinical Images

Sheldon Yao, DO
Cardiology

STUDENT AND RESIDENT PEER REVIEW INTERNS

Habiba Ahasan, OMS-I
New York Institute of Technology College of Osteopathic Medicine

Trudy-Ann Alston, DO
Philadelphia College of Osteopathic Medicine- Georgia

Melissa Anderson-Chavarria, DO, PhD Candidate
Michigan State University College of Osteopathic Medicine

Joseph A. Barber, OMS-III
Alabama College of Osteopathic Medicine

Sophia Barber, OMS-III
Kansas City University College of Osteopathic Medicine

Nicole Marie Barcega, OMS-III
Western University of Health Sciences - College of Osteopathic Medicine of the Pacific

Alyssa Benjamin OMS-III
Nova Southeastern University Dr. Kiran C. Patel College of Osteopathic Medicine

Shrishti Bhattarai, OMS-II
Arkansas College of Osteopathic Medicine

Jocelyn Canedo, OMS-III
Edward Via College of Osteopathic Medicine-Auburn

Andrew Chandler, OMS-III
Touro College of Osteopathic Medicine

Steve Collins, OMS-III
Midwestern University Arizona College of Osteopathic Medicine

Cara Conrad, OMS-III
A.T. Still University - Kirksville College of Osteopathic Medicine

Molly Cunard, OMS-III
Des Moines University College of Osteopathic Medicine

Brianna Custer, OMS-III
Liberty University College of Osteopathic Medicine

Abby Davis, OMS-I
Oklahoma State University - College of Osteopathic Medicine

James Docherty, DO
United Health Services

Alice Doong, DO
St. Mary Mercy Livonia Hospital

Renee El-Khoury, DO
Midwestern University Arizona College of Osteopathic Medicine

Atif Farid, OMS-I
New York Institute of Technology College of Osteopathic Medicine

Abigail Ferrell, OMS-I
Lake Erie College of Osteopathic Medicine

Saguftha Garasia, OMS-I
Sam Houston State University School of Osteopathic Medicine

Miranda Guerriero OMS-III
Lake Erie College of Osteopathic Medicine

Carina Harrison, OMS-II
Kansas City University College of Osteopathic Medicine

Morgan Heitt, OMS-I
Oklahoma State University College of Osteopathic Medicine

Aubrey Ann Jackson, OMS-II
Liberty University College of Osteopathic Medicine

Cody Jackson, OMS-I
A.T. Still University - School of Osteopathic Medicine in Arizona

Filza Jalees, DO
United Memorial Medical Center

Monica Kavanaugh, MPH, OMS-I
A.T. Still University - Kirksville College of Osteopathic Medicine

Taylor Keiper, OMS-III
Edward Via College of Osteopathic Medicine-Virginia

Cindy Kim, OMS-II
Western University of Health Sciences - College of Osteopathic Medicine of the Pacific

Gabriel Koch, OMS-I
Western University of Health Sciences - College of Osteopathic Medicine of the Pacific

Liana Kobayashi, DO
University of Hawaii Family Medicine Residency Program

Valeriya Korchina, DO
Des Moines University College of Osteopathic Medicine

Matthew Knapp, OMS-I
Lake Erie College of Osteopathic Medicine

Gregory Kunis, OMS-III
Nova Southeastern University Dr. Kiran C. Patel College of Osteopathic Medicine

Katie Lamar, OMS-III
Nova Southeastern University Dr. Kiran C. Patel College of Osteopathic Medicine

Adrienne Law, MS, DO
Franciscan St. James Hospital

Robert Lemme, OMS-IV
A.T. Still University - Kirksville College of Osteopathic Medicine

Jacob Lenz, OMS-II
A.T. Still University - Kirksville College of Osteopathic Medicine

Jonathan Letko, OMS-IV
Michigan State University College of Osteopathic Medicine

Samantha Long, MS, OMS-IV
Ohio University Heritage College of Osteopathic Medicine

Katherine Loomba, OMS-III
New York Institute of Technology College of Osteopathic Medicine

Karstan Luchini, OMS-II
Kansas City University Joplin

Victoria Ly, OMS-I
William Carey University College of Osteopathic Medicine

Briana Martiszus, OMS-I
Western University of Health Sciences - College of Osteopathic Medicine of the Pacific

Simran Mehrotra, OMS-I
William Carey University - School of Osteopathic Medicine

Amy McMellon, OMS-III
Arkansas College of Osteopathic Medicine

Nabeth A. Midley, OMS-II
Michigan State University - College of Osteopathic Medicine

Donielle Miller-Hesse, OMS-II
Western University of Health Sciences - College of Osteopathic Medicine of the Pacific

Yasamin Mohammadi, OMS-III
Kansas City University College of Osteopathic Medicine

Sarah Jane Muder, OMS-II
New York Institute of Technology College of Osteopathic Medicine

Kaleigh Mullen, OMS-IV
Touro University College of Osteopathic Medicine

Diem My Hoang, OMS-I
Touro University College of Osteopathic Medicine in California

Ke (Kevin) Ma, OMS-I
William Carey University College of Osteopathic Medicine

Truc Nguyen, OMS-III
Nova Southeastern University Dr. Kiran C. Patel College of Osteopathic Medicine

Awais Ur Rahman, OMS-II
Kansas City University College of Osteopathic Medicine

Aarthi Ramesh, OMS-III
Kansas City University College of Osteopathic Medicine

Daniel Resnick, OMS-I
Western University of Health Sciences - College of Osteopathic Medicine of the Pacific

Erica Romo, OMS-III
Rocky Vista University College of Osteopathic Medicine

Ammie Rupani, OMS-I
Sam Houston State University College of Osteopathic Medicine

Heemani Ruparel, OMS-III
Rowan University School of Osteopathic Medicine

Shalini Sakhamuri, OMS-III
Edward Via College of Osteopathic Medicine

Aparna Sankar, OMS-III
Texas College of Osteopathic Medicine

Shayan Shiehzadegan, OMS-III
Western University of Health Sciences - College of Osteopathic Medicine of the Pacific

Nisarg Shah, OMS-IV
Nova Southeastern University Dr. Kiran C. Patel College of Osteopathic Medicine

Mark Shokralla, OMS-I
William Carey University College of Osteopathic Medicine

Haley Spector, OMS-I
Des Moines University College of Osteopathic Medicine

Bahadar Singh Srichawla, OMS-IV
Touro College of Osteopathic Medicine - Middletown

Austen Smith, DO
Firelands Regional Medical Center

Evan Starr, OMS-I
Rocky Vista University College of Osteopathic Medicine - Southern Utah

Gayatri Susarla, OMS-I
New York Institute of Technology College of Osteopathic Medicine

Colleen Szytko, OMS-I
New York Institute of Technology College of Osteopathic Medicine

McKenna Tierney, OMS-III
Nova Southeastern University Dr. Kiran C. Patel College of Osteopathic Medicine

Taylor Totterdale, OMS-II,
Kansas City University College of Osteopathic Medicine

Johnny Voigt, OMS-I
New York Institute of Technology College of Osteopathic Medicine

Niven Wang, OMS-I
Sam Houston State University College of Osteopathic Medicine

Brandon Wolters, OMS-I
Ohio University Heritage College of Osteopathic Medicine

Kevin Wortman II, OMS-III
Edward Via College of Osteopathic Medicine - Auburn

Wei-Jen Yankelevich, PhD, OMS-IV
Michigan State University College of Osteopathic Medicine

Zachary A. Wright, OMS-III
Arizona College of Osteopathic Medicine

Tiffany Zai, MPH, OMS-II
Touro University College of Osteopathic Medicine in California

Kylie Zeng, OMS-II
Touro University Nevada College of Osteopathic Medicine

CONTENTS

EDITOR'S MESSAGE

Food for thought

Ronald P. Januchowski, DO, FACOFP, Editor

FROM THE PRESIDENT'S DESK

The pillars of ACOFP: A retrospective on the presidency

Nicole Heath Bixler, DO, MBA, FACOFP

RESEARCH ARTICLE

Osteopathic manipulative treatment for sinusitis relief:
A pilot study

Esther Lee, OMS-IV, BS; Joshua Lo, OMS-IV, MPH; Justine Tran, OMS-IV, MS; David Redding, DO

REVIEW ARTICLES

Childhood obesity: An approach to individualized treatment

Philip B. Collins, DO; Nils V. Brolis, DO

Troubleshooting common breastfeeding difficulties

Eileen M. Conaway, DO, IBCLC, FACOFP

Osteoarthritis disease progression through the lower
extremity: A literature review

David B. Canton, DO, MPH, JD; Michael A. Conte, DO; Pamela Kammen, MD

BRIEF REPORT

Generational differences in communication
and their translation to medical education

Shannon Ramsey Jimenez DO, FACOFP; Haley Ford-Wilcox, MS

CLINICAL IMAGE

Seizure induced thoracocervicofacial petechiae

Meaghan Standridge MS-IV; Lindsay Tjattas-Saleski DO, MBA, FACOEP

PATIENT EDUCATION HANDOUT

Joint injections

Ariel Shafa, BS; Eli Eshaghian, BS; Amanda Frugoli, DO, FACOI;
Steven Barr, MD, FACP

EDITOR'S MESSAGE

Food for Thought

Ronald Januchowski, DO, FACOFP, Editor, *Osteopathic Family Physician*

Depending on your mood, time of day and Internet speed, the words scattered, smothered, and covered may make you head to a music website to listen to Hootie and the Blowfish or click on your favorite food delivery service to get a bite for breakfast from Waffle House. The study of food has always been a decent way to evaluate the political, social and cultural processes. As we enter the third year of the pandemic, we have seen food highlight unique issues, impacting supply chains, home preparation and consumption. Recent media themes showing bare supermarket shelves, sourdough starter at home and a host of apps that allow for your meal to be delivered within minutes have all revolved around the distinctive nature that food plays in our lives.

This past year, I have been lucky to be a part of an elective course for medical students, Food and Nutrition as Medicine, which not only helps medical students better counsel patients on healthy diet choices, but also allows them to develop hands-on skills for healthier food preparation. Hopefully, the course helps students better understand the osteopathic tenet that rational treatment is based upon an understanding of the basic principles of body unity, self-regulation and the interrelationship of structure and function. Dietary methods can reduce blood pressure and inflammation and can produce overall better physiologic function for patients. Nutrition for patients is well beyond the Krebs cycle.

Plant-based diets often speak to the political and economic nature of food, relating how much water, land or energy is required to produce a certain diet versus another. Economically, it appears that there has been a breakthrough related to plant-based options for consumers in the supermarket as well as restaurants. The selections are not just limited to specialty food stores or boutique restaurants as it becomes "impossible" to miss seeing such items.

Believe it or not, food plays a role in almost every article in this issue. From childhood obesity to osteoarthritis, diet can be seen as an important factor in the prevention or development of disease. Have fun with this issue and make (or order) something good to eat today—even if it is scattered and covered! Enjoy the read.



Picture from @wafflehouseofficial - no copyrights

FROM THE PRESIDENT'S DESK



The Pillars of ACOFP: A Retrospective on the Presidency

Nicole Heath Bixler, DO, MBA, FACOFP
ACOFP President

In my final letter as your ACOFP president, it is my opportunity to share what I believe have been our greatest achievements since March 2020—a pivotal point for the obvious reason that the COVID-19 pandemic has affected every single decision, program, committee, student, resident and physician of our organization. The very week that my family and I were planning to travel to New Orleans for my presidential installation, the ACOFP Board of Governors was faced with the decision to convert our traditional convention to a virtual-only event. That was just one of many successful “firsts” and set the precedent for many more difficult decisions to come.

In the following six months, our country saw the devastation of our healthcare system not being prepared for the magnitude of a pandemic, the effects of isolation on our families and patients, the downfalls of virtual learning on our children and the ongoing social inequities that plague our society—all matters that shaped our organization's priorities and initiatives, as I assumed the role of president in a virtual installation in October 2020.

The Task Force on Racism and Health—later renamed the Task Force on Diversity, Equity and Inclusion (DEI)—was formulated to address the needs of ACOFP in the areas of community outreach, education and governance. The resounding effort of 33 individual ACOFP members has culminated in a 15-point plan that has been approved by the board and is being enacted through DEI resolutions, changes in gathering member demographics, the continuation of blog posts, culturally sensitive continuing medical education (CME) and the development of diverse committees to lead this work.

In tandem with these efforts, a Task Force on Governance was appointed to thoroughly evaluate our governance structure to assure it represents the members and patients we serve, while remaining nimble and responsive to changes in our environment. The extensive work of this group and your Board of Governors has already moved our organization forward and resulted in proposed changes to our Bylaws and Constitution that look to ensure adequate representation for the future of our organization. I am extremely proud of what has already been achieved and the accomplishments still to come.

As we navigated our Zoom calls, telehealth visits and new roles of home-school teachers and preceptors, ACOFP continued to innovate and adapt to bring you meaningful CME through our virtual conventions, Intensive Osteopathic Update, webinars and eLearning offerings. These efforts have been made possible by the creativity and dedication of a phenomenal staff and the willingness of speakers and educators to work outside of their comfort zone.

We have embarked on new educational pathways by collaborating with the Endocrine Society to offer a certificate program exploring diabetes care and management, with the Hepatitis B Foundation to provide complimentary CME on hepatitis B recognition and determination, and with Med-IQ to develop an HIV testing and treatment curriculum. Our re-envisioned OMTotal video library—the largest of its kind—is a testament to our commitment to osteopathic principles, highlighting over 150 OMT techniques through video and audio explanation. It is apparent that we will never return to a world without the availability of virtual CME and meetings and hope to balance that convenience with the need for human interaction and collegiality.

As I reflect on this culmination of work during my presidency, it truly is in alignment with the pillars of our ACOFP mission: visionary leadership, quality education and responsible advocacy.

Despite the lack of in-person connectivity over the past two years, the sheer nature of these circumstances has highlighted our need of belonging to ACOFP. In our November membership survey, more than 1,100 practicing physicians responded that the number-one reason for being a member was because they knew ACOFP was advocating for them and osteopathic family medicine. We have submitted more than 20 comment letters to federal legislators focused on personal protective equipment, maternal health, nutrition for children, preservation of the family medicine care model, the family physician shortage and the perpetual threat of Medicare cuts. We continue to partner with the ACOFP Education & Research Foundation and the American Osteopathic Board of Family Physicians in promoting osteopathic board certification to our graduating residents through Early Entry Initial Certification and the Initial Certification Grant program.

Our collaboration with other family medicine organizations—such as the American Academy of Family Physicians, American Board of Family Medicine and Society of Teachers of Family Medicine—has allowed us to participate in the proposed revisions to the Accreditation Council for Graduate Medical Education's program

requirements for graduate medical education in family medicine, and we are appreciative to have the osteopathic voice heard.

As I reflect on this culmination of work during my presidency, it truly is in alignment with the pillars of our ACOFP mission: visionary leadership, quality education and responsible advocacy. This work is not accomplished by one person or one president, but rather through the collective passion, diligence and perseverance of the entire board and staff. It requires listening to our membership and challenging ourselves to be inclusive and equitable in all that we do, as the future is no place to place our better days. These have been the best of my days, and I am truly grateful for having had the opportunity to serve in this capacity. To serve our profession as one of only four female presidents in the history of ACOFP, while balancing my roles as leader, physician, wife and mother during a time of uncertainty and unrest, I leave this position hoping I have made a positive impact on the future of osteopathic family medicine. I truly believe the best is yet to come.

Thank you for all that you DO.

Nicole Heath Bixler, DO, MBA, FACOFP

CALENDAR OF EVENTS

MARCH 30 - APRIL 2, 2022

AOMA 100th Annual Convention
Arizona Osteopathic Medical Association
Scottsdale, Arizona
azosteo.org

APRIL 28-30, 2022

Ohio Osteopathic Symposium
Ohio State Society of the ACOFP
Columbus, OH & Virtual
ohioacofp.org

APRIL 28 - MAY 1, 2022

122nd Annual Convention
Oklahoma Osteopathic Association
Oklahoma City, OK
okosteo.org

JUNE 17-19, 2022

TOMA/TxACOFP 15th Annual Convention
Texas State Chapter of the ACOFP
Arlington, TX
txacofp.org

JULY 15-17, 2022

Direct Primary Care Summit
ACOFP
Kansas City, MO
dpcsummit.org

JULY 27-31, 2022

46th Annual CME Seminar & Convention
American College of Osteopathic Family Physicians of California
Anaheim, CA
acofpca.org

JULY 28-31, 2022

FSACOFP Annual Convention
Florida Society of the American College of Osteopathic Family Physicians
Orlando, FL
fsacofp.org

AUGUST 5-7, 2022

ACOFP Intensive Osteopathic Update
American College of Osteopathic Family Physicians
Rosemont, IL
acofp.org

CME Resource: *Osteopathic Family Physician* Offers 2 Hours of 1-B CME

ACOFP members who read *Osteopathic Family Physician* can receive two hours of Category 1-B continuing medical education credit for completing quizzes in the journal. Visit the eLearning center at www.acofp.org to access the quizzes.

RESEARCH ARTICLE

OSTEOPATHIC MANIPULATIVE TREATMENT FOR SINUSITIS RELIEF: A PILOT STUDY

Esther Lee, OMS-IV, BS¹; Joshua Lo, OMS-IV, MPH¹; Justine Tran, OMS-IV, MS¹; David Redding, DO¹

¹Western University of Health Sciences, Pomona, CA

KEYWORDS:

Allergy

Osteopathic manipulative treatment

Otolaryngology

Sinusitis

Abstract

Introduction: Sinusitis affects more than 30 million Americans each year, with healthcare costs of \$11 billion annually. Few studies explore osteopathic manipulative treatment (OMT) as an adjunct therapy for sinusitis. Our study aims to investigate the therapeutic benefits and safety of an OMT sinusitis protocol in relieving symptoms of sinusitis.

Methods: Western University of Health Sciences Institutional Review Board approved the project. A recruitment flyer was sent out to all students from the Western University of Health Sciences College of Osteopathic Medicine of the Pacific (n=445), and 22 subjects with symptoms of sinusitis volunteered to receive OMT. Subjects signed an informed consent form prior to treatment. Treatment was standardized with the same OMT practitioner for a 14-minute OMT sinusitis protocol. Each subject was given a survey to rate the severity of sinusitis symptoms pre- and post-OMT. Symptoms measured included sinus congestion, postnasal drip, sinus pain, headache, sense of smell and fatigue. Data was analyzed using the Wilcoxon signed rank test, with significance determined by $P < 0.05$ and a 95% confidence interval.

Results: All 22 subjects reported symptomatic relief of sinus congestion, postnasal drip, sinus pain, headache, sense of smell and fatigue after OMT with each $P < 0.05$. All subjects reported an overall improvement in sinus symptoms with OMT. No adverse events of OMT were reported.

Conclusion: This study concludes that an OMT sinusitis protocol serves as a safe and beneficial option for the relief of sinusitis symptoms. The limitations of the study include lack of control group and small sample size. Future studies with a control or sham group with a larger sample size are warranted.

INTRODUCTION

Sinusitis is one of the most common health complaints in the United States, affecting more than 30 million Americans each year and costing \$11 billion annually.¹ As reported in the National Health Interview Survey, up to 14.7% of people had sinusitis the preceding year.² The etiology of sinusitis is presumed to be a combination of environmental and host factors. While viral upper respiratory infection is the most common cause of sinusitis, with up to 90% of patients with the common cold experiencing viral sinusitis symptoms, it can also be caused by allergens,

irritants, fungi and bacteria.² Symptoms of sinusitis include nasal congestion, purulent nasal discharge, postnasal drip, facial pain or pressure, fever, fatigue, cough, hyposmia or anosmia, and headache.³ It has been reported that the symptoms of sinusitis have a significant impact on health-related quality of life, high healthcare provision and significant days lost to industry.⁴ The pain and discomfort experienced by patients often make them seek additional adjunct therapies.

Treatments of sinusitis depend on the duration and severity of the symptoms. Primary management for acute sinusitis includes nasal saline irrigation and topical nasal steroids, aiming to provide symptomatic relief. Antihistamines, immunotherapy and avoidance of triggers can also be used to alleviate symptoms of sinusitis. For patients with worsening symptoms or for those who fail to improve after a 7-day observation period, oral antibiotics and oral glucocorticoids are used as second-line therapy. For patients whose symptoms do not improve with these standard medical treatments, endoscopic sinus surgery is recommended.⁵

CORRESPONDENCE:

Esther Lee, OMS-IV, BS | esther.lee1@westernu.edu

Despite the multiple conventional treatment options for sinusitis, many patients continue to suffer from frequent or chronic sinus symptoms and seek alternative therapies to complement traditional modalities.⁶

One alternative therapy includes osteopathic manipulative treatment (OMT). OMT is a variety of manual techniques utilizing palpatory skills to diagnose and treat somatic dysfunction and restore function within the body's framework. It is designed to improve physiological function and to support homeostasis.⁷ Complaints of the head, eyes, ear, nose and throat (HEENT) are often encountered in primary care, and previous literature reports that sinusitis is one of the top 15 conditions commonly treated with OMT.⁸ Likewise, an informative 1996 report on the use of OMT in an emergency department setting demonstrated sinusitis to be one of the conditions that could be ameliorated or eliminated with OMT.¹ Clinical experience has shown that incorporation of musculoskeletal treatment in the management of HEENT patients improves recovery time and reduces incidence of recurrence and complications.^{9,10} When treating sinus infections, OMT has been used to improve fluid drainage from the sinuses, to decrease pain and viscerosomatic and somato-visceral reflexes, and to alter mucus viscosity.¹¹

Despite numerous studies reporting benefits of OMT in managing HEENT complaints, there is a paucity of studies exploring OMT as an adjunctive therapy for sinusitis. In this study, the aim is to shed light on OMT as therapy for sinusitis and to assess the safety and benefit of an OMT sinusitis protocol.

METHODS

The study was conducted from November to December 2019 at the Western University of Health Sciences College of Osteopathic Medicine of the Pacific (COMP). Western University Institutional Review Board granted ethics approval for the study.

Recruitment

A flyer was sent out to all osteopathic students at the COMP campus. Inclusion criteria consisted of students who suffered from symptoms of acute or chronic sinusitis at the time of the recruitment. Exclusion criteria included subjects who did not present with symptoms of acute or chronic sinusitis at that time. Written informed consent was obtained from all subjects prior to OMT.

Experimental protocol

BEFORE THE INTERVENTION

Each subject completed surveys to rate the severity of their sinusitis symptoms pre- and post-OMT. The symptoms of sinusitis include sinus congestion (SC), postnasal drip (PND), sinus pain (SP), headache (HA), sense of smell (SM) and fatigue (FA). SC, PND, SP and HA were rated on a 0-to-3 scale with 0=no symptoms, 1=minimal symptoms, 2=moderate symptoms and 3=severe symptoms. SM was rated as 0=unable to smell, 1=intermittent smell and 2=able to smell. FA was rated as 0=not present and 1=present. The overall quality of life with sinus symptoms was

rated on a 0-to-10 scale with 0 indicating no interference with daily life and 10 indicating severe interference with daily life.

A single osteopathic physician at Western University of Health Sciences designed and performed an OMT sinusitis protocol for all subjects. The OMT sinusitis protocol lasted approximately 14 minutes per subject. The subject was either prone or supine for the duration of the protocol, with the exception of being seated during the thoracic muscle energy technique.

The protocol included the following techniques performed in the order as listed below from numbers 1 to 8. Each technique lasted, on average, 2 minutes. The high-velocity, low-amplitude techniques and Chapman points technique took 1 minute each. The sphenopalatine ganglion release took 3 minutes to complete. Myofascial release; muscle energy; and high-velocity, low-amplitude techniques were performed based on the somatic dysfunctions found by the physician.

- 1. Cervical soft tissue technique:** The investigator palpated the paravertebral musculature of the cervical spine with second and third finger pads of both hands. Anterior, lateral and superior half-circles were formed with moderate pressure until a softening was felt by the investigator. This was repeated for the entire cervical region.
- 2. Cervical myofascial release technique:** The investigator contacted the suboccipital muscle masses bilaterally with the second and third finger pads of both hands and applied superior traction until resistance was felt. The investigator held the traction until a release was felt.
- 3. Cervical high-velocity, low-amplitude technique:** The occipitoatlantal (OA) joint and C2-C7 vertebrae were evaluated in the 3 motions of flexion/extension, sidebending and rotation. The atlantoaxial (AA) joint was evaluated in only rotation. For subjects with OA somatic dysfunction, the investigator locked out the OA joint in all 3 planes of restriction and applied a quick sidebending thrust toward the subject's contralateral eye. For the AA joint and C2-C7 vertebrae, the investigator locked out the affected segment in all planes of restriction and applied a quick rotational thrust.
- 4. Thoracic muscle energy technique:** Using the head as a lever, the investigator monitored the restricted upper thoracic spinous processes with one hand. With his other hand, he contacted the superior aspect of the subject's head and slowly brought it into the restriction of all 3 flexion/extension, sidebending and rotation motions. The subject was then instructed to contract their head back to neutral position for 5 seconds against the investigator's unyielding counterforce. The subject was then told to relax so the investigator could passively take the subject's head to its new restrictive barrier. This process was repeated 3 times.

5. Scapular release technique: The investigator contacted the medial border of the scapula with his hand closer to the subject's head while using his other hand to contact the subject's forearm to induce internal rotation of the shoulder to provide better grip on the medial border of the scapula. Lateral traction was applied at the medial border of the scapula until resistance was felt. The investigator held the traction until a release was felt. This technique was repeated on the contralateral side.

6. Thoracic high-velocity, low-amplitude technique: T1–T4 segments were evaluated for somatic dysfunction. Rotating the subject toward him, the investigator placed his thenar eminence on the subject's posterior transverse process and rolled the subject to the supine position over his thenar eminence. The investigator then placed the subject's elbow into his epigastrium, localizing his weight over his thenar eminence. With his other hand, the investigator flexed the subject's head and sidebent it into its restriction to the level of the dysfunctional segment. The subject was instructed to inhale and exhale as the investigator increased localization to the segment by applying his weight. For flexed segments, a quick thrust was applied directly along the subject's anterior-posterior axis from the investigator's epigastrium to his thenar eminence. For extended segments, the thrust was applied 45° superior to the subject's anterior-posterior axis from the investigator's epigastrium to his thenar eminence.

7. Chapman points technique: Nodular hypertonic spheres located in the first intercostal space adjacent to the sternum were located bilaterally and massaged with the second finger pads for 30 seconds.

8. Intra-oral sphenopalatine ganglion release technique: Using a gloved hand, the investigator slid his fifth finger inside the oral cavity along the lateral surface of the maxilla until coming into contact with the flat surface of the lateral pterygoid plate. The tip of the finger was turned upward on the lateral plate, and gentle pressure was applied until softening was felt. This process was repeated on the contralateral side.

AFTER THE INTERVENTION

Each subject completed a post-OMT survey identical to the pre-OMT survey. Statistical analysis was performed using the Wilcoxon signed rank test (SPSS, version 27.0; IBM SPSS). Significance was established at $P < 0.05$.

RESULTS

A total of 22 subjects who had symptoms of sinusitis were included in the study. No subjects were excluded from the study. The median age was 25 years old, and 12 subjects (55%) were women. The duration of symptoms ranged from 2 to 56 days. Subjects presented with symptoms of sinusitis secondary to upper respiratory infections (n=10), chronic sinusitis (n=7), allergies (n=4) and unknown (n=1). Out of 22 subjects, 12 treated

their sinusitis symptoms with traditional treatment modalities, including decongestants (n=11), antihistamines (n=8), saline irrigation (n=4) and antibiotics (n=1). Ten of 22 subjects were not using any treatments for their sinusitis symptoms. These findings are shown in **Table 1**.

All subjects reported relief of sinus congestion, postnasal drip, sinus pain, headache, sense of smell and fatigue after OMT ($P < 0.05$). These findings are demonstrated in **Table 2**.

TABLE 1:

Background information (n=22)

		N	%
Gender	Male	10	45.5%
	Female	12	54.5%
Reason for sinus symptoms	Upper respiratory infection	10	45.5%
	Chronic sinusitis	7	31.8%
	Allergies	4	18.2%
	Unknown	1	4.5%
Treatment	Decongestant	11	50.0%
	Antihistamines	8	36.4%
	Saline irrigation	4	18.2%
	Antibiotics	1	4.5%
Duration of symptoms	Range, days	2–56	

TABLE 2:

Changes in symptoms of sinusitis pre-OMT and post-OMT (n=22)

Symptom	Pre-OMT	Post-OMT	P value
Sinus congestion (SC) ^a	1.36 (0.79)	0.64 (0.66)	0*
Postnasal drip (PND) ^a	1.5 (0.96)	0.86 (0.71)	0.003*
Sinus pain (SP) ^a	1.50 (1.47)	0.68 (0.95)	0.002*
Headache (HA) ^a	1.95 (2.04)	0.82 (1.50)	0.002*
Smell (SM) ^b	1.32 (0.84)	1.73 (0.55)	0.024*
Fatigue (FA) ^c	0.64 (0.49)	0.36 (0.49)	0.014*

^aSymptom scale scores were 0 to 3 with 0= no symptom, 1= minimal symptoms, 2= moderate symptom, 3= severe symptom
^bSymptom scale scores were 0= unable to smell, 1= intermittent smell, 2= smell
^cSymptom scale scores were 0= not present, 1= present
 *Statistically significant <0.05

All subjects reported an overall improvement in symptoms of sinusitis following OMT. Immediately after OMT, 4 out of 22 subjects reported minimal relief, 16 out of 22 subjects reported moderate relief, and 2 out of 22 subjects reported complete resolution of overall sinus symptoms. The subjects also reported reduction in interference of sinus symptoms with daily life after OMT ($P < 0.05$). No adverse effects of OMT were reported.

FIGURE 1:

Subjective reporting of overall improvement in sinus symptoms with OMT

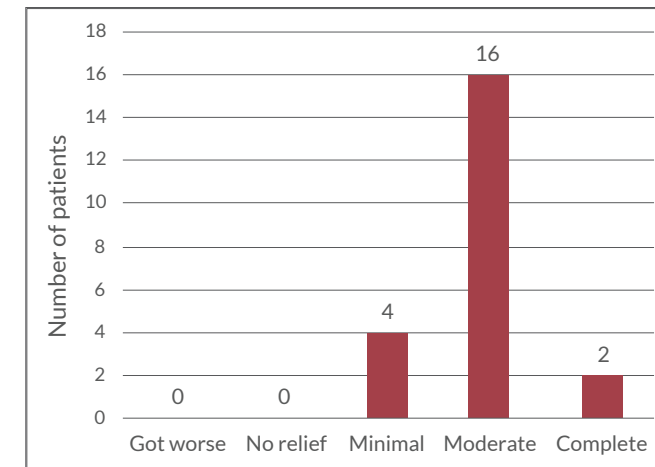
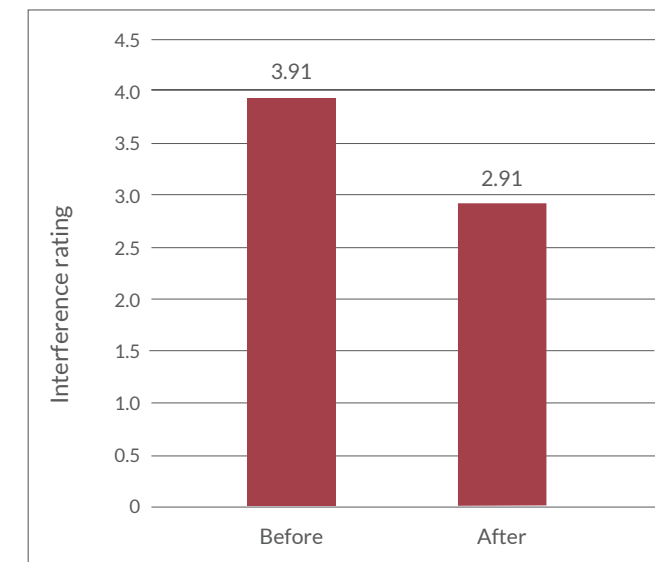


FIGURE 2:

Average rating of interference of sinus symptoms with daily life



DISCUSSION

Our OMT sinusitis protocol has safely demonstrated the subjective improvement of sinus symptoms among the subjects. Our data supports the hypothesis that OMT sinusitis protocol results in improved sinusitis symptoms. All 22 subjects reported improvement in self-reported nasal congestion, postnasal drip, sinus pain, headache, sense of smell and fatigue.

Our OMT sinusitis protocol was developed to affect muscle constraint on venous and lymphatic flow, and to alter somato-visceral reflexes to the sinuses.¹² Muscle activity is a well-recognized mechanism of lymphatic flow. Because lymphatic channels are embedded in the cervical fascia, OMT techniques using soft tissue, muscle energy and myofascial release to the cervical region contribute to increased lymphatic flow to the head.¹¹ In addition, lymphatic fluid from the head and neck enter the central circulation in the subclavian and internal jugular veins. Treatment of somatic dysfunction in these areas may further improve lymphatic flow.¹¹ Furthermore, our sinusitis protocol was also developed to address somatic dysfunctions to balance the autonomic nervous systems to ultimately relieve symptoms of sinusitis. Autonomics also play an important role in understanding the pathophysiology of OMT in sinusitis. Sympathetic fibers to the head arise from the upper thoracic segments of the cord (T1–T3). Preganglionic fibers ascend from there and synapse at the superior cervical ganglion located in the upper cervical area. Postganglionic fibers then join the internal carotid plexus, becoming part of the deep petrosal nerve and the nerve of the pterygoid canal. Sympathetic supply to the nose and paranasal sinus passes through the sphenopalatine ganglion in the pterygopalatine fossa. The sympathetic nervous system to the nose produces vasoconstriction and increased nasal airway patency.¹¹ Therefore, tissue changes in the upper cervical and upper thoracic regions would be expected to accompany sympathetic motor dysfunction of the nose and paranasal sinuses in patients with sinusitis.¹¹ OMT can be used to impact sympathetic vasomotor tone to the sinus area and ultimately improve the symptoms of sinusitis. Henley-Ivins *et al.* have demonstrated the benefit of OMT balancing autonomics by quantifying the relationship with myofascial release and vagal response of the autonomics.¹³ Sphenopalatine ganglion (SPG) acupuncture has also shown to improve nasal ventilation by increasing sympathetic nerve excitability in healthy volunteers.¹⁴ Furthermore, a Chapman point was used to further influence viscerosomatic reflexes to sinuses.

Our study further builds upon Lee-Wong *et al.*'s work on OMT for sinusitis. Lee-Wong *et al.* performed a study of 15 patients with chronic sinusitis in an outpatient allergy clinic that demonstrated sinus pain, headache, sense of smell and fatigue.

Our study further builds upon Lee-Wong *et al.*'s work on OMT for sinusitis. Lee-Wong *et al.* performed a study of 15 patients with chronic sinusitis in an outpatient allergy clinic that demonstrated improvement in symptoms using OMT techniques. The study utilized direct pressure and sinus drainage techniques aimed to relieve sinus pain, pressure and congestion by unblocking nasal passages and improving lymphatic flow.⁶ Our study extended

the Lee-Wong *et al.* study by including a larger sample group and designing an OMT sinusitis protocol that may be helpful for physicians treating sinusitis.

The limitations of the study include small sample size and lack of a control group to compare the effectiveness of OMT to the standard of care for sinusitis. The study was also confounded by several factors related to subjects, including varying causes of sinusitis, duration and severity of sinusitis, and previous treatments of sinusitis. Furthermore, the study does not explore the efficacy of each technique used in our OMT sinusitis protocol. Thus, it is difficult to deduce which technique was most beneficial in treatment of sinusitis. Future studies with larger and more diverse subject populations can serve as a better predictor of the effectiveness of OMT in a population.

CONCLUSION

Our study has shown that OMT results in symptomatic improvement of sinusitis by alleviating nasal congestion, postnasal drip, sinus pain, headache, loss of smell and fatigue. Thus, OMT may be recommended as a stand-alone treatment for patients suffering from sinusitis or may be used in conjunction with traditional therapies to maximize treatment benefits and to relieve symptoms of sinusitis in primary care settings. Further studies that replicate these results may support the inclusion of OMT techniques in current standards of care. Additional studies with more subjects and a control or sham group are warranted to assess efficacy of the treatment. Moving forward, we hope to build the stepping-stones of exploring OMT as a mainstay treatment option for sinusitis by assessing and testing its efficacy against a larger population sample size. Through this work, OMT can also be further explored as treatment in other disease processes.

Funding and Disclosures: None of the authors or contributors had conflicts of interest or financial disclosures relevant to the topic of the manuscript.

REFERENCES

- Rosenfeld RM, Piccirillo JF, Chandrasekhar SS, *et al.* Clinical practice guideline (update): adult sinusitis. *Otolaryngol Head Neck Surg.* 2015; 152(2 Suppl):S1–S39. doi:10.1177/0194599815572097
- Battisti AS, Modi P, Pangia J. Sinusitis. In: *StatPearls*. StatPearls Publishing; 2021. PMID:29262090
- Fokkens WJ, Lund VJ, Mullol J, *et al.* EPOS 2012: European position paper on rhinosinusitis and nasal polyps 2012. A summary for otorhinolaryngologists. *Rhinology.* 2012;50(1):1–12. doi:10.4193/Rhino12.000
- Lintonbon D. A study to investigate the effect of ‘frontal lift’ osteopathic manipulative technique (OMT) in patients with chronic sinusitis. *Am J Biomed Sci & Res.* 2019;3(2):213–222. doi:10.34297/AJBSR.2019.03.000665
- Gosepath J, Pogodsky T, Mann WJ. Characteristics of recurrent chronic rhinosinusitis after previous surgical therapy. *Acta Otolaryngol.* 2008;128(7):778–784. doi:10.1080/00016480701724896

- Lee-Wong M, Karagic M, Doshi A, Gomez S, Resnick D. An osteopathic approach to chronic sinusitis. *J Aller Ther.* 2011;2(2): 1–3. doi:10.4172/2155-6121.1000109
- Johnson SM, Kurtz ME. Osteopathic manipulative treatment techniques preferred by contemporary osteopathic physicians. *J Am Osteopath Assoc.* 2003;103(5):219–224. PMID:12776762
- Johnson SM, Kurtz ME. Conditions and diagnoses for which osteopathic primary care physicians and specialists use osteopathic manipulative treatment. *J Am Osteopath Assoc.* 2002;102(10):527–532, 537–540. PMID:12401039
- Pintal WJ, Kurtz ME. An integrated osteopathic treatment approach in acute otitis media. *J Am Osteopath Assoc.* 1989;89(9):1139–1141. PMID:2793535
- Sato A, Schmidt RF. The modulation of visceral functions by somatic afferent activity. *Jpn J Physiol.* 1987;37(1):1–17. doi:10.2170/jjphysiol.37.1
- Wu S, Hostoffer RW, Gibbons K, Shaw HH, Shaw MB. Osteopathic considerations in patients with head, eyes, ears, nose, and throat disorders. In: *Foundations of Osteopathic Medicine: Philosophy, Science, Clinical Applications, and Research.* 4th ed. Wolters Kluwer; 2018: 1404–1411.
- Shrum KM, Grogg SE, Garton P, Shaw HH, Dyer RR. Sinusitis in children: the importance of diagnosis and treatment. *J Am Osteopath Assoc.* 2001;101(5):S8–S13. PMID:11409262
- Henley CE, Ivins D, Mills M, Wen FK, Benjamin BA. Osteopathic manipulative treatment and its relationship to autonomic nervous system activity as demonstrated by heart rate variability: a repeated measures study. *Osteopath Med Prim Care.* 2008;2(1):7. doi:10.1186/1750-4732-2-7
- Wang K, Chen L, Wang Y, Wang C, Zhang L. Sphenopalatine ganglion acupuncture improves nasal ventilation and modulates autonomic nervous activity in healthy volunteers: A randomized controlled study. *Sci Rep.* 2016;6(1):29947. doi:10.1038/srep29947

REVIEW ARTICLE

CHILDHOOD OBESITY: AN APPROACH TO INDIVIDUALIZED TREATMENT

Philip B. Collins, DO¹; Nils V. Brolis, DO²

¹Rowan University School of Osteopathic Medicine – Family Medicine, Stratford, NJ

²Rowan University School of Osteopathic Medicine – Academic Affairs, Stratford, NJ

KEYWORDS:

Adolescent

Child

Obesity

Overweight

Abstract

In the United States, obesity prevalence has surpassed alarming rates and reached epidemic proportions with increased body mass index and poor diet being among the top causes of morbidity and mortality. Approximately 18.5% of children in the United States have obesity. Childhood obesity is associated with medical conditions such as cardiovascular disease, type 2 diabetes mellitus, asthma and musculoskeletal disorders among other conditions. It is also associated with an increased risk for discrimination and bullying. The goal of treatment in the pediatric and adolescent patient with overweight or obesity is to develop healthy habits and lifestyle patterns which will hopefully persist into adulthood in order to prevent future adverse health outcomes, improve quality of life and improve body image and self-esteem. Osteopathic family physicians are well suited to provide the needed comprehensive care, taking a holistic, patient-centered treatment approach including nutrition, activity and behavior. While therapeutic lifestyle changes are the primary focus of treatment, the provider must also consider socioeconomic factors, mental health, treatment of comorbidities and familial factors when determining treatment. This article aims to summarize the risks and consequences of childhood obesity as well as outline the approach the osteopathic family physician can take to assessment and treatment of the pediatric patient with obesity.

INTRODUCTION

Childhood obesity is a disease with a multifaceted etiology and numerous individual, environmental, and socioeconomic determinants.¹ In the United States, obesity prevalence rates have reached epidemic proportions with two out of every three adults having overweight or obesity.^{2, 3} In fact, the average body mass index (BMI) of adults in the United States is approaching the range of obesity.⁴ This growing prevalence in recent years is concerning, as increased BMI and poor diet are among the top causes of morbidity and mortality in the United States.⁵ Unfortunately, children are not spared from this epidemic. According to the U.S. Centers for Disease Control and Prevention (CDC), as of 2015–2016, 18.5% of children in the United States had obesity—affecting approximately 13.7 million children and adolescents. Obesity rates were found to be 13.9% among those aged 2–5 years old, 18.4% among those aged 6–11 years old and

20.6% among those aged 12–19 years old.⁶ This article aims to summarize the risks and consequences of childhood obesity as well as outline the approach the osteopathic family physician can take to assess and treat the pediatric patient with obesity.

DEFINING OBESITY

Obesity refers to excessive accumulation of body fat and, in adults, is measured based on BMI, which is body weight adjusted for body height measured in kg/m². Normal weight BMI is defined as 18–24.9, overweight 25–29.9, class I obesity 30–34.9, class II obesity 35–39.9 and class III obesity ≥40.7 BMI measurement has long been used as a validated screening tool for overweight and obesity in children and is recommended with a Grade B evidence level by the United States Preventive Services Task Force (USPSTF) for children aged 6 years and older.^{8,9} In children, BMI is adjusted based on percentile for age and sex. Normal weight is defined as the 5–84.9 percentile for the child’s respective age and sex, overweight as the 85–94.9 percentile, obesity as ≥95 percentile to 120% of the 95th percentile, class II obesity as >120% of 95th percentile and class III as >140% of 95th percentile.¹⁰ While there are some limitations with BMI, and other measures of adiposity exist, BMI is the simplest way to screen for obesity.¹¹ It should also be noted that there is no accepted definition for obesity in children under 24 months;¹² however, those at risk can be identified using World Health Organization (WHO) weight for length (WFL) charts.¹³

CORRESPONDENCE:

Philip B. Collins, DO | collinsp@rowan.edu

CONSEQUENCES

The potential consequences of childhood obesity are many. Childhood obesity has been associated with complications including, but not limited to: cardiovascular disease, type 2 diabetes mellitus, asthma, obstructive sleep apnea, musculoskeletal disorders, nonalcoholic fatty liver disease, attention deficit/hyperactivity disorder, conduct disorder, depression, learning disability, developmental delay and lower executive function.¹⁴⁻²² Complications related to poor nutrition and lack of exercise have been highlighted during the COVID-19 pandemic, as early studies suggest an increasing rate of type 2 diabetes mellitus among children in the United States.^{23,24} Childhood obesity has also been associated with increased risk of cancer and research indicates a particular increase in multiple myeloma, colorectal, uterine corpus, gallbladder, kidney, and pancreatic cancers in young adults who had obesity as children.^{25,26} Additionally, children with obesity are at increased risk of discrimination and bullying.²⁷ To make matters worse, the complications of obesity do not end in childhood. Children and adolescents with obesity are 5 times more likely to have obesity as adults, with around 80% of adolescents with obesity maintaining that status as adults.²⁸

CAUSES AND RISK FACTORS

There are many contributing factors to childhood and adolescent obesity, with genes, behavior and environment all playing roles. Clinicians should pay particular attention to patients with risk factors for developing obesity. Risk factors include obesity in the mother and father, poor nutrition, decreased physical activity, sedentary behavior, poor sleep, increased intake of sugar sweetened beverages, fast food, television in the bedroom and low family income.²⁹ Clinicians should be mindful of risk factors in younger children as well which can include maternal/gestational diabetes, gestational hypertension, maternal smoking, gestational weight gain, and rapid infant growth.^{29,30}

Another risk factor that may not be as obvious to some clinicians is food insecurity. Food insecurity and obesity have long been associated with each other, as they are potential products of socioeconomic disadvantage.³¹ The United States Department of Agriculture (USDA) defines food insecurity as reduced quality, variety, or desirability of diet or disrupted eating patterns and reduced food intake.³² Screening for food insecurity can be done quickly with the 2-item Hunger Vital Sign™ screening tool, which uses a subset of 2 questions from the USDA's Household Food Security Scale.³³ Affirmative answers to either of the questions can help identify food insecurity. With this knowledge, physicians can help direct qualified patients to government resources, such as the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) and the Supplemental Nutrition Assistance Program (SNAP).^{34,35}

TABLE 1:

Review of systems³⁸

SYSTEM REVIEWED	SYMPTOMS TO ASSESS	POSSIBLE COMORBIDITIES
General	Loud Snoring Daytime sleepiness	Obstructive sleep apnea
	Shorter sleep duration Delayed onset of sleep	Disordered sleep
Respiratory	Shortness of breath Exercise intolerance Wheezing Cough	Asthma
Gastrointestinal	General abdominal pain RUQ or epigastric pain Intermittent or colicky pain	Nonalcoholic fatty liver disease Gallbladder disease Constipation
	Heartburn Dysphagia Chest discomfort	Gastroesophageal reflux
Endocrine	Polyuria Polydipsia Fatigue Nocturia	Type 2 diabetes mellitus
Musculoskeletal	Knee pain Leg bowing	Blount's disease
	Hip pain Groin pain	Slipped capital femoral epiphysis
Psychiatric/ Psychological	Nervousness School Avoidance Social inhibition	Bullying
	Depressed mood Loss of interest/pleasure	Depression
	Worries/fears	Anxiety
	Body dissatisfaction Hyperphagia Binge eating	Eating disorder
Gynecological	Oligomenorrhea Dysfunctional uterine bleeding Hirsutism Acne	Polycystic ovarian syndrome
Skin	Skin pigmentation Skin tags	Insulin resistance
	Rash	Intertrigo

The physical examination of a child with obesity includes a general examination with special attention to certain foci. While a complete history will direct the exam, physicians should pay particular attention to blood pressure and heart rate when evaluating vital signs. Physicians should also note if any of the following are present: acanthosis nigricans, skin tags, acne and hirsutism in pubertal girls, evidence of papilledema on fundoscopic exam, tenderness and/or limited range of motion of joints of the lower extremities, peripheral edema, and examination of the thyroid for possible goiter.⁴⁰

TREATMENT

The goal of treatment in the pediatric and adolescent patient with overweight or obesity is to develop healthy habits and lifestyle patterns which will hopefully persist into adulthood and prevent future adverse health outcomes, improve quality of life and improve body image and self-esteem.³⁷ The approach should be patient-centered and comprehensive including nutrition, activity, behavior, and, in some cases, pharmacotherapy and even bariatric surgery. An interdisciplinary team-based approach may work best for some patients.⁴⁰ The USPSTF has determined that a comprehensive, team-based approach can be effective, including primary care clinicians, exercise physiologists, physical therapists, dieticians, diet assistants, psychologists and social workers.⁹

Unfortunately, weight bias is quite prevalent in health care, not only in the United States, but also across the globe.^{41,42} Worse yet, this bias can have adverse consequences on patient care.⁴³ Research suggests some physicians spend less time with patients with obesity than other patients.⁴⁴ Additionally, studies have found perceived weight stigma can contribute to unhealthy eating behaviors among patients and contribute to exercise avoidance.^{45,46} Clinicians should use sensitivity when discussing this diagnosis to avoid embarrassment.⁴⁷ Care should be taken to use "patient first" language, such as "person with obesity" rather than "obese person."⁴⁸ Clinicians should avoid terms like "fat" and "obese" as these words have a strong negative connotation and can have a detrimental impact on the patient.⁴⁹ Neutral terms like "weight" and "body mass index" are preferred to avoid any embarrassment or shame in the patients and their families.⁵⁰ In light of the *21st Century Cures Act*, physicians should also follow this guidance for documentation, not just discussion.⁵¹ Physicians can also help reduce the likelihood of stigmatization by role modeling professional behavior in the office and assuring a welcoming environment for patients of diverse body sizes.⁵⁰ One area of the clinical setting where this is easily addressed is the waiting room. The chairs should be able to support a child or parent with a higher body weight, and arm rests that may limit one's ability to sit comfortably should be avoided.⁵⁰ Another facet that can easily be addressed is placement of the scale. A scale should be in a private area and should be capable of weighing a patient with a higher body weight.⁵⁰

Evidence of interventions improving weight bias in healthcare professionals is lacking, and it is likely that more than one strategy is needed to improve this bias.⁵² On an individual level there are resources available to those who wish to learn more about implicit weight bias.⁵⁰ On a broader level, research has shown that a comprehensive curriculum focused on obesity can improve osteopathic medical students' attitudes toward and knowledge of obesity.⁵³ More implementation of obesity and weight bias education into medical school curricula may be of benefit in reducing weight bias in physicians.

A clinician should focus on educating patients, as well as families, and encouraging healthy lifestyles.¹⁸ There is not one specific diet recommended for all children; however, there are some general guidelines that if applied may aid in obesity reduction. Sugar-sweetened beverages, processed foods, fast food, candies, snacks, cakes, animal products, whole milk and refined grains can be associated with higher rates of obesity.⁵⁴ Clinicians should advise patients and their parents of these findings to provide general guidance. On the other hand, diets with low levels of sugar and fat and high levels of fruits, vegetables, whole grains, fish, nuts, legumes and yogurt are less associated with obesity.⁵⁴

Behavioral approaches

Behavioral interventions have been demonstrated to lead to improvement of weight in children and adolescents. In one analysis of interventions targeted to children aged 6 years and older, those that were effective offered education on topics like dietary intake and exercise, delivered behavioral training (ie, goal setting, contingent rewards) and involved a total of 26 contact hours or more. These contact hours took place over the course of 2-12 months in a variety of settings, including group sessions, individual sessions, parent-only, child-only and family sessions.⁹ They also commonly targeted both parent and child and included physical activity under supervision.^{29,55} Based on these observations, successful behavioral interventions should include education on both physical activity and nutrition, adoption of healthy behaviors through goal-directed change and delivery on a frequent basis over an extended period of time.^{9,56}

Effective behavioral interventions should also be personalized and detailed. A healthcare provider should utilize their earlier assessment of the patient's dietary and physical activity history to identify gaps from what is recommended. In addition, the provider should also identify any barriers that have prevented the patient from reaching a healthy weight in the past, along with determining the readiness of the patient and their family to commit to change.⁵⁷ This information can be effectively gleaned through the use of a motivational interview, a communication style in which the provider utilizes questioning to understand and strengthen a patient's commitment to change.⁵⁸

Physical activity recommendations in children are offered based on the amount of time and level of intensity.⁵⁹ Activities to be encouraged should be age-appropriate, emphasize a variety of physical skills and are enjoyed by the child.⁶⁰ Activities that develop fundamental movement skills (ie, running, kicking, throwing, catching, jumping, balance) should be prioritized, as those children who are competent are more likely to be physical activity as they become older.⁶¹ Furthermore, the healthcare provider should also focus on reducing the amount of time a child is sedentary—non-academic screen time should be limited and replaced by physical activity when appropriate.⁵⁷

TABLE 2:

Physical activity recommendations for children⁵⁹

AGE	ACTIVITY AMOUNT	ACTIVITY INTENSITY*
3–5 years old	>180 minutes/day	Any intensity, some moderate to vigorous
5–17 years old	>60 minutes/day	Moderate to vigorous intensity; activity type should include bone/muscle strengthening 3 days/week

*Activity intensity is rated as light, moderate, or vigorous. Light is defined by the metabolic equivalent of the task (MET) < 3 (eg., walking, playing catch). Moderate is defined by MET 3–6 (eg., jogging, yardwork). Vigorous is defined by MET > 6 (eg., running, ice skating, jumping rope).

For children not meeting the recommended level of physical activity, families should be given examples of activities appropriate for age, skill and intensity. The amount of time per day and days per week spent in the activity should be gradually increased in small increments until the recommended amount is achieved.⁵⁹

Dietary recommendations in children and adolescents, referring to calorie intake and diet composition, will differ based on age and gender (the USDA's Dietary Reference Intake Calculator for Healthcare Professionals can be used to estimate calorie and nutrient needs). Specific exploration of sugar-sweetened beverage intake (ie, soda, fruit drinks, sports drinks) is also encouraged; these beverages are often calorie-dense and contribute added sugars to the diet.⁶² If dietary calorie intake is determined to be excessive, consider focusing on specific behaviors which increase calorie intake (eg, avoid drinking soda) as opposed to focusing on calorie limits themselves (eg, consume fewer than 2,000 calories per day).

Both physical activity and dietary intake can be effectively influenced through the use of cognitive behavioral techniques. This approach involves setting achievable goals, tracking behaviors that signify change and then reinforcing those behaviors with non-food rewards; these rewards include verbal praise and expanded privileges.⁵⁷ It is important to emphasize that it is the achievement of a behavioral goal that should be rewarded and not weight change itself. Parents should also be encouraged to role-model these same behaviors that may create healthy habits in children.⁵⁷ There are several topics which behavioral goals can be structured around; a single topic should be selected for discussion per office visit.^{9,56}

TABLE 3:

Examples of behavior goals that promote healthy weight^{9,56}

BEHAVIORAL GOALS
Eating 5+ fruit/vegetable servings per day
Limiting non-academic screen time to < 1-hour per day
Avoidance of sugar-sweetened beverages
Demonstration of portion control
Use of self-monitoring logs (ie, dietary intake, physical activity, screen time)
Increasing moderate to vigorous physical activity
Limiting take-out/fast food dining
Achieving adequate sleep

Weight targets should be established for the provider to monitor improvement in weight over time. While this weight goal can be shared with patients and their families, providers should be mindful not to prioritize weight change over behavior change. The target for children and adolescents will vary based on age and BMI percentile.^{9,56}

TABLE 4:

Weight loss goal recommendations^{9,56}

BMI	RECOMMENDATION
85th to 94th percentile	Ages 2–18 should maintain weight or have BMI trend downward
95th to 98th percentile	Ages 2–5 should maintain weight or have BMI trend downward Ages 6–11 should lose no more than 1 lb per month Ages 12–18 should lose no more than 2 lb per week
BMI 99th percentile and above	Ages 2–5 should lose no more than 1 lb per month until BMI < 97th percentile Ages 6–18 should lose no more than 2 lb per week

Adherence rates to a behavioral intervention is believed to be a key part of its success.^{29,55} Follow-up visits should be scheduled based on the patient's readiness to change and the counseling being offered. Commonly, visits are scheduled monthly during the initial stages of weight management but may be arranged on a weekly basis in more intensive interventions. Weight targets should be reevaluated every 3–6 months. If progress toward a weight target is not being seen in 6–12 months the patient should be considered for other treatment measures or referral to a weight management specialist. If weight loss is being seen at rates greater than recommended, screening for an eating disorder should occur and the patient referred as appropriate.^{9,56}

Pharmacotherapy

When lifestyle modifications and behavioral interventions are not enough to control obesity, medications can be considered as adjunctive therapy. As of now, there are only 3 approved

medications for weight loss in adolescents. Phentermine hydrochloride is approved for children aged 16 years or older, and orlistat and liraglutide are approved for children at least 12 years old.⁶³⁻⁶⁵

While there are not many pharmacologic options to treat obesity in children, the clinician still plays an important role when it comes to the effect of medication on a patient's weight. Care should be taken to avoid obesogenic medications, if possible, when treating other conditions in pediatric patients with overweight and obesity. The Endocrine Society published guidelines in 2016 with recommendations for pharmacologic treatment of conditions other than obesity to avoid further weight gain due to iatrogenic effects of medications.⁶⁶ In a patient with type 2 diabetes mellitus, metformin and GLP-1 agonists are recommended if not contraindicated. Angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs) and calcium channel blockers are preferred over beta-blockers in the treatment of hypertension. Oral contraceptives are recommended over injectable medications due to weight gain with injectables. Nonsteroidal anti-inflammatory drugs and disease-modifying antirheumatic drugs are preferred in patients with chronic inflammatory disease due to the potential weight gain associated with corticosteroids. When antidepressant medication is needed, one should know that tricyclic antidepressants and mirtazapine have been associated with weight gain. Paroxetine is the selective serotonin reuptake inhibitor most associated with weight gain, whereas fluoxetine and sertraline are more likely associated with weight loss. If antipsychotic medication is indicated then ziprasidone and aripiprazole are preferred over olanzapine, quetiapine and risperidone. When considering antiepileptic medications, it should be noted that weight loss may be seen with felbamate, topiramate, and zonisamide whereas gabapentin, pregabalin, valproic acid, vigabatrin, and carbamazepine have been associated with weight gain.⁶⁶

Bariatric surgery

While bariatric surgery is not well studied in the adolescent population, adolescent patients with obesity along with comorbid conditions who have failed comprehensive behavioral interventions may be candidates for surgical or device therapy. The American Academy of Pediatrics recommends that bariatric surgery be considered in patients with class II obesity (BMI ≥ 35 , or 120% of the 95th percentile for age and sex, whichever is lower) with clinically significant comorbid conditions and patient with class III obesity (BMI ≥ 40 , or 140% of the 95th percentile for age and sex, whichever is lower).⁶⁷ Adolescent patients seeking bariatric surgery face a number of barriers including, but not limited to, lack of insurance approval⁶⁸ lack of provider knowledge⁶⁹ and access to a tertiary care facility that is prepared to provide bariatric surgical care to the pediatric population.⁷⁰

OSTEOPATHIC PHILOSOPHY

The osteopathic family physician is particularly well-equipped to treat obesity in the pediatric population. Obesity as a disease impacts multiple organ systems and can affect the psychosocial aspects of a child's life in many ways. By following the tenets of

osteopathic medicine, a physician can ensure a holistic approach to the evaluation and treatment of obesity that addresses the patient's biopsychosocial well-being.⁷¹ From a biomechanical perspective, there is limited research in the use of osteopathic manipulative treatment in this population. However, there is research suggesting the effectiveness of osteopathic manipulative treatment in treating musculoskeletal complaints in adult patients with obesity.⁷² Because of greater ligamentous laxity in children that results in an increase in range of motion, tissue and muscle tone assessments become more important in terms of evaluation; a head-to-toe structural exam can be helpful. Somatic findings that may be limiting physical mobility and function should be addressed. Note that as a child becomes older their body will grow and mature, impacting body structure and related function. As a result, structural reevaluation should be performed regularly.⁷³

CONCLUSION

The rate of obesity in children and adolescents has been, and continues to be, on the rise. Preventing and treating obesity in this population requires a comprehensive approach including counseling on healthy diet and exercise, behavioral interventions, possible pharmacotherapy and, in some cases, surgical referral. A team-based approach is recommended including physicians, exercise physiologists, physical therapists, dietitians, diet assistants, psychologists, and social workers. Care should be taken to recognize and avoid any biases and person first language should be used when discussing obesity with patients. Osteopathic family physicians are well suited to provide the needed comprehensive care taking a holistic treatment approach in all patients. Further research is needed on the effects of osteopathic manipulative treatment on pediatric patients with obesity and whether this could be a viable treatment to indirectly aid in weight loss. While therapeutic lifestyle changes are the primary focus of treatment, the provider must also consider socioeconomic factors, mental health, treatment of comorbidities and familial factors when determining treatment.

Disclosures and Funding: The authors received no financial support related to this submission and have no financial affiliations related to this article to disclose. Philip B. Collins, DO, is a member of the ACOFP Editorial Committee.

REFERENCES

- Jastreboff AM, Kotz CM, Kahan S, Kelly AS, Heymsfield SB. Obesity as a disease: The Obesity Society 2018 position statement. *Obesity (Silver Spring)*. 2019;27(1):7–9. doi:10.1002/oby.22378
- Hales CM, Fryar CD, Carroll MD, Freedman DS, Ogden CL. Trends in obesity and severe obesity prevalence in US youth and adults by sex and age, 2007–2008 to 2015–2016. *JAMA*. 2018;319(16):1723–1725. doi:10.1001/jama.2018.3060
- Fryar CD, Carroll MD, Ogden CL. Prevalence of overweight, obesity, and extreme obesity among adults aged 20 and over: United States, 1960–1962 through 2011–2014. National Center for Health Statistics Data, Health E-Stats, July 2016. Available at https://www.cdc.gov/nchs/data/hestat/obesity_adult_13_14/obesity_adult_13_14.htm

4. Fryar CD, Kruszon-Moran D, Gu Q, Ogden CL. Mean body weight, height, waist circumference, and body mass index among adults: United States, 1999–2000 through 2015–2016. *Natl Health Stat Report*. 2018;(122):1–16. PMID: 30707668
5. The US Burden of Disease Collaborators. The state of US health, 1990–2016: Burden of diseases, injuries, and risk factors among US States. *JAMA*. 2018;319(14):1444–1472. doi:10.1001/jama.2018.0158
6. Hales CM, Carroll MD, Fryar CD, Ogden CL. Prevalence of obesity among adults and youth: United States, 2015–2016. *NCHS Data Brief*. 2017;(288):1–8. PMID: 29155689
7. Defining Adult Overweight and Obesity. Centers for Disease Control and Prevention. <https://www.cdc.gov/obesity/adult/defining.html>. Published September 17, 2020. Accessed January 9, 2021.
8. Pietrobelli A, Faith MS, Allison DB, et al. Body mass index as a measure of adiposity among children and adolescents: A validation study. *J Pediatr*. 1998;132(2):204–210. doi:10.1016/s0022-3476(98)70433-0
9. US Preventive Services Task Force. Screening for obesity in children and adolescents: US Preventive Services Task Force Recommendation Statement. *JAMA*. 2017;317(23):2417–2426. doi:10.1001/jama.2017.6803
10. Gulati AK, Kaplan DW, Daniels SR. Clinical tracking of severely obese children: a new growth chart. *Pediatrics*. 2012;130(6):1136–1140. doi:10.1542/peds.2012-0596
11. Brown CL, Perrin EM. Obesity prevention and treatment in primary care. *Acad Pediatr*. 2018;18(7):736–745. doi:10.1016/j.acap.2018.05.004
12. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011–2012. *JAMA*. 2014;311(8):806–814. doi:10.1001/jama.2014.732
13. Daniels SR, Hassink SG, Committee on Nutrition. The role of the pediatrician in primary prevention of obesity. *Pediatrics*. 2015;136(1):e275–292. doi:10.1542/peds.2015-1558
14. Umer A, Kelley GA, Cottrell LE, Giacobbi P, Innes KE, Lilly CL. Childhood obesity and adult cardiovascular disease risk factors: a systematic review with meta-analysis. *BMC Public Health*. 2017;17(1):683. doi:10.1186/s12889-017-4691-z
15. Bacha F, Gidding SS. Cardiac abnormalities in youth with obesity and type 2 diabetes. *Curr Diab Rep*. 2016;16(7):62. doi:10.1007/s11892-016-0750-6
16. Caprio S, Santoro N, Weiss R. Childhood obesity and the associated rise in cardiometabolic complications. *Nat Metab*. 2020;2(3):223–232. doi:10.1038/s42255-020-0183-z
17. Peters U, Dixon AE, Forno E. Obesity and asthma. *J Allergy Clin Immunol*. 2018;141(4):1169–1179. doi:10.1016/j.jaci.2018.02.004
18. Kumar S, Kelly AS. Review of childhood obesity: From epidemiology, etiology, and comorbidities to clinical assessment and treatment. *Mayo Clin Proc*. 2017;92(2):251–265. doi:10.1016/j.mayocp.2016.09.017
19. Pollock NK. Childhood obesity, bone development, and cardiometabolic risk factors. *Mol Cell Endocrinol*. 2015;410:52–63. doi:10.1016/j.mce.2015.03.016
20. Africa JA, Newton KP, Schwimmer JB. Lifestyle interventions including nutrition, exercise, and supplements for nonalcoholic fatty liver disease in children. *Dig Dis Sci*. 2016;61(5):1375–1386. doi:10.1007/s10620-016-4126-1
21. Quek YH, Tam WWS, Zhang MWB, Ho RCM. Exploring the association between childhood and adolescent obesity and depression: a meta-analysis. *Obes Rev*. 2017;18(7):742–754. doi:10.1111/obr.12535
22. Rollins BY, Riggs NR, Francis LA, Blair CB. Executive function and BMI trajectories among rural, poor youth at high risk for obesity. *Obesity (Silver Spring)*. 2021;29(2):379–387. doi:10.1002/oby.23064
23. Hsia DS, Lim M, Beyl RA, Hasan HA, Gardner J. 153-LB: Initial presentation of children with type 2 diabetes during the COVID-19 pandemic. *Diabetes*. 2021;70:153–LB. doi:10.2337/db21-153-LB
24. Marks BE, Khilnani A, Meyers A, et al. Increase in the diagnosis and severity of presentation of pediatric type 1 and type 2 diabetes during the COVID-19 pandemic. *Horm Res Paediatr*. 2021;94:275–284. doi:10.1159/000519797
25. Sung H, Siegel RL, Rosenberg PS, Jemal A. Emerging cancer trends among young adults in the USA: analysis of a population-based cancer registry. *Lancet Public Health*. 2019;4(3). doi:10.1016/s2468-2667(18)30267-6
26. Berger NA. Young adult cancer: Influence of the obesity pandemic. *Obesity (Silver Spring)*. 2018;26(4):641–650. doi:10.1002/oby.22137
27. Beck AR. Psychosocial aspects of obesity. *NASN Sch Nurse*. 2016 Jan;31(1):23–27. doi:10.1177/1942602X15619756
28. Simmonds M, Llewellyn A, Owen CG, Woolcott N. Predicting adult obesity from childhood obesity: a systematic review and meta-analysis. *Obes Rev*. 2016 Feb;17(2):95–107. doi:10.1111/obr.12334. Epub 2015 Dec 23.
29. O'Connor EA, Evans CV, Burda BU, Walsh ES, Eder M, Lozano P. *Screening for Obesity and Intervention for Weight Management in Children and Adolescents: A Systematic Evidence Review for the US Preventive Services Task Force. Evidence Synthesis No. 150*. Rockville, MD: Agency for Healthcare Research and Quality; 2017. AHRQ publication 15-05219-EF-1.
30. Patro Golab B, Santos S, Voerman E, et al. Influence of maternal obesity on the association between common pregnancy complications and risk of childhood obesity: an individual participant data meta-analysis. *Lancet Child Adolesc Health*. 2018;2(11):812–821. doi:10.1016/S2352-4642(18)30273-6
31. Frongillo EA, Bernal J. Understanding the coexistence of food insecurity and obesity. *Current Pediatrics Reports*. 2014;2(4):284–290. doi:10.1007/s40124-014-0056-6
32. Definitions of Food Security. USDA ERS - Definitions of Food Security. <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx>. Published September 9, 2020. Accessed January 10, 2021.
33. Hager ER, Quigg AM, Black MM, et al. Development and validity of a 2-item screen to identify families at risk for food insecurity. *Pediatrics*. 2010;126(1):e26–32. doi:10.1542/peds.2009-3146
34. Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). USDA. <https://www.fns.usda.gov/wic>. Accessed June 13, 2021.
35. Supplemental Nutrition Assistance Program (SNAP). USDA. <https://www.fns.usda.gov/snap/supplemental-nutrition-assistance-program>. Published April 23, 2021. Accessed June 13, 2021.
36. Wang L, Collins C, Ratliff M, Xie B, Wang Y. Breastfeeding Reduces Childhood Obesity Risks. *Child Obes*. 2017;13(3):197–204. doi:10.1089/chi.2016.0210
37. Cuda S, Censani M, O'Hara V, Browne N, Paisley J. Pediatric obesity algorithm eBook, presented by the Obesity Medicine Association. www.obesitymedicine.org/childhood-obesity.
38. Krebs NF, Himes JH, Jacobson D, Nicklas TA, Guilday P, Styne D. Assessment of child and adolescent overweight and obesity. *Pediatrics*. 2007;120:S193–S228.
39. Mason K, Page L, Balikcioglu PG. Screening for hormonal, monogenic, and syndromic disorders in obese infants and children. *Pediatr Ann*. 2014;43(9):e218–e224. doi:10.3928/00904481-20140825-08
40. Styne DM, Arslanian SA, Connor EL, et al. Pediatric Obesity-Assessment, Treatment, and Prevention: An Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab*. 2017;102(3):709–757. doi:10.1210/jc.2016-2573

41. Lessard LM, Puhl RM, Himmelstein MS, Pearl RL, Foster GD. Eating and Exercise-Related Correlates of Weight Stigma: A Multinational Investigation. *Obesity (Silver Spring)*. 2021;29(6):966–970. doi:10.1002/oby.23168.
42. Puhl RM, Lessard LM, Himmelstein MS, Foster GD. The roles of experienced and internalized weight stigma in healthcare experiences: Perspectives of adults engaged in weight management across six countries. *PLoS One*. 2021;16(6):e0251566. doi:10.1371/journal.pone.0251566.
43. Puhl RM, Phelan SM, Nadglowski J, Kyle TK. Overcoming weight bias in the management of patients with diabetes and obesity. *Clin Diabetes*. 2016;34(1):44–50. doi:10.2337/diaclin.34.1.44
44. Richard P, Ferguson C, Lara AS, Leonard J, Younis M. Disparities in physician-patient communication by obesity status. *Inquiry*. 2014;51:0046958014557012. doi:10.1177/0046958014557012
45. Araiza AM, Wellman JD. Weight stigma predicts inhibitory control and food selection in response to the salience of weight discrimination. *Appetite*. 2017;114:382–390. doi:10.1016/j.appet.2017.04.009
46. Han S, Agostini G, Brewis AA, Wutich A. Avoiding exercise mediates the effects of internalized and experienced weight stigma on physical activity in the years following bariatric surgery. *BMC Obes*. 2018;5:18. doi:10.1186/s40608-018-0195-3
47. Barlow SE, Expert Committee. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: a summary report. *Pediatrics*. 2007;120:S164–S192.
48. Cardel MI, Atkinson MA, Taveras EM, Holm JC, Kelly AS. Obesity Treatment Among Adolescents: A Review of Current Evidence and Future Directions. *JAMA Pediatr*. 2020;174(6):609–617. doi:10.1001/jamapediatrics.2020.0085
49. Puhl RM, Himmelstein MS. Adolescent preferences for weight terminology used by health care providers. *Pediatr Obes*. 2018 Sep;13(9):533–540. doi:10.1111/ijpo.12275
50. Pont SJ, Puhl R, Cook SR, Slusser W; SECTION ON OBESITY; OBESITY SOCIETY. Stigma Experienced by Children and Adolescents With Obesity. *Pediatrics*. 2017 Dec;140(6):e20173034. doi:10.1542/peds.2017-3034. Epub 2017 Nov 20.
51. 21st Century Cures Act: Interoperability, Information Blocking, and the ONC Health IT Certification Program. Federal Register. <https://www.federalregister.gov/documents/2020/05/01/2020-07419/21st-century-cures-act-interoperability-information-blocking-and-the-onc-health-it-certification>. Published May 1, 2020. Accessed June 17, 2021.
52. Alberga AS, Pickering BJ, Alix Hayden K, Ball GD, Edwards A, Jelinski S, Nutter S, Oddie S, Sharma AM, Russell-Mayhew S. Weight bias reduction in health professionals: a systematic review. *Clin Obes*. 2016 Jun;6(3):175–88. doi:10.1111/cob.12147. PMID: 27166133.
53. Gayer GG, Weiss J, Clearfield M. Fundamentals for an Osteopathic Obesity Designed Study: The Effects of Education on Osteopathic Medical Students' Attitudes Regarding Obesity. *J Am Osteopath Assoc*. 2017 Aug 1;117(8):495–502. doi:10.7556/jaoa.2017.099.
54. Liberali R, Kupek E, Assis MAA. Dietary Patterns and Childhood Obesity Risk: A Systematic Review. *Child Obes*. 2020 Mar;16(2):70–85. doi:10.1089/chi.2019.0059. Epub 2019 Nov 19.
55. O'Connor EA, Evans CV, Burda BU, Walsh ES, Eder M, Lozano P. Screening for Obesity and Intervention for Weight Management in Children and Adolescents: Evidence Report and Systematic Review for the US Preventive Services Task Force. *JAMA*. 2017 Jun 20;317(23):2427–2444. doi:10.1001/jama.2017.0332.
56. Spear BA, Barlow SE, Ervin C, Ludwig DS, Saelens BE, Schetzina KE, Taveras EM. Recommendations for treatment of child and adolescent overweight and obesity. *Pediatrics*. 2007 Dec;120 Suppl 4:S254–88. doi:10.1542/peds.2007-2329F.
57. Hagan JF, Shaw JS, Duncan PM. Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents. 4th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2017.
58. Miller WR, Rollnick S. Motivational Interviewing: Helping People Change. 3rd ed. New York, NY: Guilford Press; 2013.
59. 2018 Physical Activity Guidelines Advisory Committee Scientific Report. Physical Activity Guidelines. https://health.gov/sites/default/files/2019-09/PAG_Advisory_Committee_Report.pdf. Published February 2018. Accessed June 18, 2021.
60. Lipnowski S, Leblanc CM; Canadian Paediatric Society, Healthy Active Living and Sports Medicine Committee. Healthy active living: physical activity guidelines for children and adolescents. *Paediatr Child Health*. 2012;17(4):209–212.
61. Jaakkola T, Yli-Piipari S, Huotari P, Watt A, Liukkonen J. Fundamental movement skills and physical fitness as predictors of physical activity: a 6-year follow-up study. *Scand J Med Sci Sports*. 2016; 26(1):74–81.
62. U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020–2025. 9th Edition. December 2020.
63. Ryder JR, Kaizer A, Rudser KD, Gross A, Kelly AS, Fox CK. Effect of phentermine on weight reduction in a pediatric weight management clinic. *Int J Obes (Lond)*. 2017;41(1):90–93. doi:10.1038/ijo.2016.185. Epub 2016 Oct 24.
64. Chanoine JP, Hampl S, Jensen C, Boldrin M, Hauptman J. Effect of orlistat on weight and body composition in obese adolescents: a randomized controlled trial. *JAMA*. 2005 Jun 15;293(23):2873–2883. doi:10.1001/jama.293.23.2873
65. Kelly AS, Auerbach P, Barrientos-Perez M, et al. A randomized, controlled trial of liraglutide for adolescents with obesity. *N Engl J Med*. 2020;382(22):2117–2128. doi:10.1056/NEJMoa1916038
66. Apovian CM, Aronne LJ, Bessesen DH, et al. Pharmacological management of obesity: an endocrine Society clinical practice guideline. *J Clin Endocrinol Metab*. 2015;100(2):342–362. doi:10.1210/jc.2014-3415
67. Armstrong SC, Bolling CF, Michalsky MP, et al. Pediatric metabolic and bariatric surgery: evidence, barriers, and best practices. *Pediatrics*. 2019;144(6):e20193223. doi:10.1542/peds.2019-3223
68. Inge TH, Boyce TW, Lee M, Kollar L, et al. Access to care for adolescents seeking weight loss surgery. *Obesity (Silver Spring)*. 2014;22(12):2593–2597. doi:10.1002/oby.20898
69. Vanguri P, Lanning D, Wickham EP, Anbazhagan A, Bean MK. Pediatric health care provider perceptions of weight loss surgery in adolescents. *Clin Pediatr (Phila)*. 2014;53(1):60–65. doi:10.1177/000922813500848
70. Bolling CF, Armstrong SC, Reichard KW, Michalsky MP. Metabolic and bariatric surgery for pediatric patients with severe obesity. *Pediatrics*. 2019 Dec;144(6):e20193224. doi:10.1542/peds.2019-3224.
71. Tenets of osteopathic medicine. <https://osteopathic.org/about/leadership/aoa-governance-documents/tenets-of-osteopathic-medicine/>. Accessed March 18, 2021.
72. Vismara L, Cimolin V, Menegoni F, et al. Osteopathic manipulative treatment in obese patients with chronic low back pain: a pilot study. *Man Ther*. 2012;17(5):451–455. doi:10.1016/j.math.2012.05.002
73. Seffinger MA. *Foundations of Osteopathic Medicine: Philosophy, Science, Clinical Applications, and Research*. Wolters Kluwer; 2018.

REVIEW ARTICLE

TROUBLESHOOTING COMMON BREASTFEEDING DIFFICULTIES

Eileen M. Conaway, DO, IBCLC

¹ Tideland Health Family Medicine Residency, Myrtle Beach, SC

KEYWORDS:

Breastfeeding
Breastfeeding difficulty
Breastmilk
Lactation

Abstract:

The majority of women who initiate breastfeeding at birth do not meet long term exclusive breastfeeding recommendations. This early weaning is often the result of breastfeeding difficulties and misinformation. Access to lactation professionals is limited for many patients and family physicians can help bridge this care gap.

INTRODUCTION

The majority of women (84.1%) in the United States initiate breastfeeding at birth, yet only 25.6% breastfeed exclusively to six months are in line with recommendations from the World Health Organization (WHO) and the Centers for Disease Control (CDC).¹⁻³ Self-reported data from 1323 women who participated in an infant feeding study revealed some common reasons for very early cessation of breastfeeding including concerns that breastmilk alone isn't satisfying the infant (53.7%), infant trouble with sucking and latching (49.7%), insufficient milk supply (51.7%), and maternal (23%) or health professional (19.8%) concerns over low infant weight gain.⁴ Women additionally reported stopping due to maternal illness or need for medication.⁴ The Affordable Care Act of 2012 mandated private health insurance coverage of lactation support services and breast pumps.⁵ While this did lead to increase in breastfeeding duration by 10% (0.57 months; $p = .007$), insurance covered lactation services are still limited by many plans to hospital support only, prenatal breastfeeding education classes, or care only when complications arise.^{6,7} Patients with Medicaid may not have any coverage of lactation services and access varies state to state.⁸ Some insurance plans do not cover visits to outpatient lactation consultants at all simply because they do not credential them as service providers.⁷ This demonstrates the need for better education of physicians in their support and care of breastfeeding women to help them achieve breastfeeding success. Osteopathic family physicians are uniquely poised to provide full spectrum care, including osteopathic

manipulation when indicated, for breastfeeding dyads and improve breastfeeding rates. This article will address common breastfeeding problems and their basic management.

LATCHING ISSUES

Infants with trouble latching and sucking should be evaluated by an osteopathic physician comfortable with cranial osteopathic manipulation given the prevalence of somatic dysfunction in these infants.⁹ Breastfeeding should be observed to assess maternal comfort and infant latch.¹⁰ An optimal latch is deep and asymmetric with areolar tissue, not just the nipple, in the infant's mouth.¹¹ The infant should be carefully examined for tongue tie, other structural issues, and somatic dysfunction.¹² In a randomized controlled trial of 97 mother-infant dyads, osteopathic manipulation combined with lactation consultation demonstrated significant improvement ($p=0.001$) in LATCH score¹³, which assesses infant response at the breast, maternal comfort, and need for assistance while feeding.¹⁴ Vismara *et al*¹⁵ reported a significant reduction in the days from birth to attaining oral feeding in premature infants who receive osteopathic manipulation. All breastfeeding dyads with feeding difficulties would benefit from evaluation by a skilled lactation consultant who can assist with troubleshooting these difficulties.¹⁶ There is an ongoing clinical trial further investigating the effect of osteopathic manipulation on infant latch.¹⁷

ENGORGEMENT

Early postpartum engorgement can be treated with ice packs, non-steroidal anti-inflammatories (NSAIDs), and cabbage leaves applied to the breasts after feeding.¹⁸ During lactogenesis II, the stage following delivery through postpartum day 9, the blood flow to the breast increases in order to bring the nutrients necessary to enrich breastmilk.¹⁹ Early engorgement is usually a result of tissue

FIGURE 1:

Various reverse pressure softening techniques



Engorgement after the immediate postpartum period is usually either the result of hyperlactation or missed or delayed feeds.^{18,19} Care must be taken not to skip or delay emptying of the breast to the point of engorgement as this triggers feedback inhibitor of lactation (FIL) and will downregulate the milk supply.¹⁹ In the case of hyperlactation FIL downregulation may help normalize supply.¹⁹

NIPPLE CRACKING

Early nipple cracking and damage is almost always due to poor latch and must be assessed by a skilled physician or lactation consultant.²⁵ A study of 1243 mother-infant dyads reported 32% of women developed cracked nipples within the first month after delivery.²⁶ This damage can be treated with mupirocin, irradiated topical wound honey, hydrogel breast pads, silver nursing cups, and perhaps the temporary use of a nipple shield while strategies for improved latch are taught.¹⁸ Nipple shields should not be routinely used without medical indication as they do not facilitate proper deep latching.¹⁸

FLAT OR INVERTED NIPPLES

Flat or inverted nipples can be drawn out with a self-rolling technique (Figure 2), a nipple everting device, using an electric breast pump for 1–2 minutes prior to feeding, and commercial nipple shells.¹⁸ Inverted or flat nipples may resolve a few months into the breastfeeding journey as they are repeatedly drawn out during feedings.¹⁸ Side-lying nursing might be a beneficial position for these patients.

FIGURE 2:

Nipple rolling technique



PERCEIVED LOW MILK SUPPLY

Maternal concerns about insufficient milk supply should be delineated as true or perceived low supply. The latter can often be combated with education about normal newborn behaviors, milk

supply, and feeding patterns. Average milk supply is 24–30 oz in a 24-hour period or approximately 1–1.25 oz per hour from both breasts combined from one to six months postpartum.²⁷ Using a 24-hour weight as the baseline weight, as opposed to birth weight, can be useful when monitoring for infant weight loss in the neonatal period.²⁸ This combats the artificial inflation of infant weight due to induced fluid retention during labor from maternal intravenous fluid and exogenous oxytocin. The NEWT calculator²⁹ can also be used to track neonatal weight trends. For the first 4 months of life, adequate daily weight gain should be calculated using the minimum of 30 g per day as a guide.³⁰ At home, families can monitor wet diapers for adequate intake. Although not an exact science, a weighted transfer can be performed in the office. This is performed by weighing the infant, allowing them to breastfeed until satisfied, and then reweighing the infant without changing clothing or diapers. The weight gained is an estimate of the volume of breastmilk transferred by the infant. It is important to remember that infant volume intake varies greatly throughout the day, so one weighted transfer should not be used to diagnose insufficient intake.³¹

TRUE LOW MILK SUPPLY

The most common cause of low milk supply is insufficient number of breastfeeding sessions that may be a result of scheduling feeds, unnecessary supplementation, convenience bottles overnight by an alternate caregiver to encourage maternal sleep, or infant sleep training.^{11,18,32} Most women need to empty their breasts 8–12 times per day to maintain full supply.³³ True low milk supply based on medical conditions can be caused by placenta retention, Sheehan's syndrome, hypothyroidism, prior breast or chest surgery, maternal illness, and increased insulin associated with polycystic ovarian syndrome, obesity, and diabetes.¹⁸ Less than 5% of women have breast hypoplasia as a result of insufficient glandular tissue proliferation during puberty or pregnancy.³⁴ These women may display wide-spaced breasts and deny a of history breast growth during pregnancy. While women with breast hypoplasia can still breastfeed, they may fail to produce a full milk supply despite intervention due to insufficient glandular tissue.³⁴

There are some prescription and non-prescription galactagogues that can aid in increasing milk supply when indicated.^{35,36} Fenugreek, shatavari, torbangun, fennel, milk thistle, chasteberry and goat's rue are commonly cited herbal galactagogues; however, they lack clear evidence and their use is largely anecdotal.^{35,36} Metoclopramide has low quality evidence for use, but given the risk of extrapyramidal side effects it is typically only used for one to two weeks and tapered. Domperidone, a dopamine agonist, is commonly used world-wide to stimulate breastmilk production, but it is not FDA approved and therefore is unavailable in the United States.³⁵

Osteopathic physicians should evaluate patients with low milk supply for somatic dysfunction, keeping in mind the tenet that structure and function are interrelated. Consider evaluating T2–T6 and the corresponding ribs as this represents the main innervation to the breast and nipple.^{37,38} The internal thoracic artery delivers the primary blood supply to the breast and it travels just inferior to the clavicle and between the pectoralis major and minor

CORRESPONDENCE:

Eileen M. Conaway, DO, IBCLC | econawaydo@gmail.com

muscles prior to descending into the breast, so dysfunctions of these structures could be evaluated as well.^{38,39} There is an ongoing study investigating the use of osteopathic manipulation on milk production in women with low supply.⁴⁰

OVERACTIVE LETDOWN

Some women experience very fast letdown of milk which will result in volumes too large for an immature infant to handle. Laid-back or physiologic nursing is a good position for this situation.¹⁸ The mother may need to pump for 1–2 minutes prior to direct feeding or hand express a small volume to make the rush of milk more manageable for the infant.¹⁸ This should not be done routinely, but only as necessary in the case of overactive letdown so as not to induce hyperlactation. As infants grow beyond the newborn period, fast letdown often becomes less of an issue as their feeding skills improve. Overactive letdown may be seen alone or in conjunction with hyperlactation.

HYPERLACTATION

It is common for women to experience breast fullness during the first month of lactation after which the milk supply generally self-regulates to match the infant's needs.⁴¹ This loss of feeling of fullness around 1 month often unnecessarily triggers concern for insufficient supply. Hyperlactation is a condition in which a woman persistently produces more milk than the infant consumes. The underlying causes are usually divided into three categories: self-induced, iatrogenic and idiopathic. Some women believe that they must undertake a rigorous pumping schedule in the early postpartum period or consume galactagogues in order to 'bring the milk in' or are perhaps erroneously instructed to do so by a healthcare professional. The result is often self-induced or iatrogenic oversupply. These cases can be addressed by discontinuing the causal practice.⁴¹ For women with idiopathic hyperlactation many will respond to block feeding which is best undertaken with close supervision by a knowledgeable physician.⁴¹ Block feeding is commonly done by directly feeding from a single breast for 3 hours at a time, alternating breasts for each cycle during the day and then ad lib feeding from both breasts from 6 pm onward overnight.^{41,42} If this technique is successful there is typically improvement within 24–48 hours.⁴¹ This practice must be monitored carefully given the risks of complications such as mastitis and over suppression of lactation resulting in too little breastmilk volume.⁴¹

CLOGGED MILK DUCTS

Clogged milk ducts can occur at any point during breastfeeding and may present as sharp nipple pain with feeding and a palpable area of firmness in the breast. There is little rigorous evidence for their treatment. Common recommendations in the breastfeeding community are hot compresses or nipple soaks in warm water and gentle massage or vibration during the feed to the area of firmness. Oral lecithin, a fat emulsifier is also commonly recommended to treat and prevent plugged ducts, however again there is insufficient evidence for this practice.^{43,44} Directly feeding the infant with the breast in a downward dangling position and

the infant chin oriented towards the area of restriction is also anecdotally recommended to assist in unclogging but this benefit remains unstudied. The nipple should be examined for a bleb blocking a nipple pore that can be easily unroofed in the office with the edge of an 18-gauge needle.²⁵ Recurrent blebs can be treated with a short course of low-potency topical steroids.²⁵ Plugged milked ducts or other causes of milk stasis may precipitate mastitis.⁴⁵

MASTITIS

Dicloxacillin remains the treatment of choice for mastitis for symptoms that fail conservative management of NSAIDs and efficient milk removal for 24 hours.⁴⁵ Milk culture should be performed if there is no clinical response to antibiotics in two days, if the infection is recurrent, or hospital acquired.⁴⁵ Jackson and Loveless⁴⁶ report success with OMT in recurrent mastitis in a case report. They have undertaken a clinical trial investigating the use of OMT in recurrent mastitis. If mastitis progresses to abscess, serial percutaneous needle aspiration or placement of a small surgical drain to gravity is preferred over traditional incision and drainage to prevent cutaneous milk fistula.⁴⁵ A lactating breast should never be packed with gauze as this would simply result in milk-soaked gauze, delayed healing, and fistula. The underlying cause of both clogged milk ducts and mastitis is often inadequate emptying of the breast or hyperlactation.⁴⁵ By screening for these issues with a careful history and addressing them with appropriate management, recurrence can be prevented.⁴⁵

PERSISTENT PAIN WITH BREASTFEEDING

While women may experience temporary soreness of the nipples in the first few weeks of breastfeeding, persistent pain should be investigated. The causes of pain are numerous and best delineated with a very detailed history. The Academy of Breastfeeding Medicine protocol #26 clearly outlines common causes and key history features that aid in diagnosis. Reported common causes include: infant ankyloglossia (tongue-tie), breast pump trauma, eczema, psoriasis, superficial bacterial infection, bacterial dysbiosis, candidiasis, herpes simplex and zoster, vasospasm, allodynia, recurrent plugged ducts, and hyperlactation. Pain in the first few weeks should trigger an evaluation of the infants' latch.⁴⁷

CONCLUSION

The Cost of Not Breastfeeding tool⁴⁸ estimates the total combined cost across health systems, mortality, and cognitive losses in the United States due to inadequate breastfeeding at \$114,968,113,478. Globally, improved breastfeeding rates would result in 98,243 fewer women dying of breast cancer, ovarian cancers, and type 2 diabetes; 595,375 fewer annual childhood deaths from diarrhea or pneumonia; and 975,000 fewer cases of childhood obesity every year.⁴⁹ Given the lack of access to lactation professionals and the number of women who discontinue breastfeeding due to difficulty, family physicians need to be able to troubleshoot common breastfeeding issues and support their breastfeeding patients (Table 1). The Academy of Breastfeeding Medicine has 34 published protocols encompassing best practices

in lactation and a broad range of topics for easy reference.⁵⁰ Most importantly, as with any organ system that is not functioning as expected, all breastfeeding issues should be evaluated, and the patient referred to appropriate consultants if the physician is unable to provide the needed care. Overall, there is very little research surrounding difficulties encountered during lactation. Well-designed studies to grow the evidence-base for interventions would be beneficial.

TABLE 1:

Summary: troubleshooting common breastfeeding problems

PROBLEM	TREATMENT
Latch	<ul style="list-style-type: none"> • Osteopathic evaluation and treatment • Skilled latch assessment
Early post-partum engorgement	<ul style="list-style-type: none"> • Reduce edema: ice, cabbage leaves, NSAIDs, therapeutic self-breast massage • Reverse-pressure softening to assist latch (Figure 1) • Osteopathic techniques for edema: pedal pump, thoracic pump, effleurage
Late engorgement (1 month and beyond)	<ul style="list-style-type: none"> • Ensure no delay or skipped breast emptings • Address hyperlactation
Early nipple cracking/damage	<ul style="list-style-type: none"> • Address latch • Irradiated wound care honey • Mupirocin • Hydrogel breast pads • Silver nursing cups • Temporary use of nipple shield
Flat or inverted nipple	<ul style="list-style-type: none"> • Electric breast pump 1–2 mins prior to feeding • Finger rolling technique (Figure 2) • Nipple evertor • Nipple shells
Perceived low milk supply	<ul style="list-style-type: none"> • Educate normal average milk volumes: 24–30oz in 24 hours or 1–1.25oz/hr both breasts combined • Educate normal infant behavior
True low milk supply	<ul style="list-style-type: none"> • Ensure sufficient number of breast emptings (most women need 8–12 per 24 hrs) • Ensure no scheduled feeds, unnecessary supplementation, or convenience bottles • Identify medical cause: placenta retention, Sheehan's syndrome, hypothyroidism, prior breast or chest surgery, maternal illness, and increased insulin associated with polycystic ovarian syndrome, obesity, and diabetes • Consider herbal galactagogue or metoclopramide taper • Osteopathic evaluation and treatment for structure that could be related to breast function, T2-6 & corresponding ribs may be key
Overactive let-down	<ul style="list-style-type: none"> • Laid-back nursing • Electric/hand/silicone pump to remove approximately 0.5 oz only if needed
Hyperlactation	<ul style="list-style-type: none"> • Self-induced/iatrogenic: eliminate causal practice • Idiopathic: block feeding for 24–48 hours with close medical supervision
Clogged ducts	<ul style="list-style-type: none"> • Ensure adequate emptying • Address underlying hyperlactation if present • Examine for nipple bleb • Hot compress • Epsom salt nipple soaks • Massage/vibration during feeds • Dangle feeds • Sunflower lecithin • Topical steroids for recurrent bleb
Mastitis	<ul style="list-style-type: none"> • Conservative treatment for 24 hours: NSAIDs and efficient milk removal • Dicloxacillin • Milk-culture if no response to antibiotics in 48 hrs, recurrence or hospital acquired infection
Persistent pain	<ul style="list-style-type: none"> • See Academy of Breastfeeding Medicine Protocol #2646

ACKNOWLEDGEMENTS

The author would like to thank the following for their feedback on this article: Allison Ward-Moore, MD, IBCLC, and Katrina Weirauch, DO, IBCLC.

Funding and Disclosures: The author received no financial support related to this submission and have no financial affiliations or conflict of interest related to this article to disclose.

REFERENCES

- American Academy of Pediatrics. Policy Statement: Breastfeeding and the Use of Human Milk. *Pediatrics*. 2012;129(3):e827-841. doi:10.1542/peds.2011-3552
- World Health Organization. Statement: Exclusive breastfeeding for six months best for babies everywhere. Jan 2011. http://www.who.int/mediacentre/news/statements/2011/breastfeeding_20110115/en/
- Centers for Disease Control and Prevention. Breastfeeding Report Card. 2020. <https://www.cdc.gov/breastfeeding/data/reportcard.htm> Updated Sept 17, 2020. Accessed Feb 23, 2021
- Li R, et al. Why mothers stop breastfeeding; mothers' self-reported reasons for stopping during the first year. *Pediatrics*. 2008;122 Suppl 2:S69-76.
- Kapinos KA, Bullinger L, Gurley-Calvez T. The Affordable Care Act, Breastfeeding, and Breast Pump Health Insurance Coverage. *JAMA Pediatr*. 2018;172(11):1002-1004. doi:10.1001/jamapediatrics.2018.2003
- Gurley-Calvez T, Bullinger L, Kapinos KA. Effect of the Affordable Care Act on Breastfeeding Outcomes. *Am J Public Health*. 2018;108(2):277-283. doi:10.2105/AJPH.2017.304108
- Carr T. Wriggling Around Law, Insurers Deny Coverage for Breastfeeding Help: Families are being forced to pay out-of-pocket for lactation consultants and related services. Is that legal? *Undark* Aug, 2019. <https://undark.org/2019/08/19/breastfeeding-lactation-consultant-insurance-coverage/#:~:text=Federal%20guidelines%20specify%20that%20insurance,for%20the%20duration%20of%20breastfeeding.> Accessed April 15, 2021.
- Center for Medicaid and CHIP Services. Medicaid coverage for lactations services. Jan 2012. https://www.medicare.gov/medicaid/quality-of-care/downloads/lactation_services_issuebrief_01102012.pdf. Accessed April 15, 2021.
- Frymann V. Relation of disturbances of craniosacral mechanisms to symptomatology of the newborn: Study of 1,250 infants. *Journal AOA*. 1966(65).
- American Academy of Pediatrics Policy Statement: Breastfeeding and the use of human milk. *Pediatrics* 2005;115:496. doi:10.1542/peds.2004-2491
- Neifert MR. Breastmilk transfer: positioning, latch-on, and screening for problems in milk transfer. *Clin Obstet Gynecol*. 2004;47(3):656-675. doi:10.1097/01.grf.0000136183.12304.96
- Amir LH, James JP, Donath SM. Reliability of the hazelbaker assessment tool for lingual frenulum function. *Int Breastfeed J*. 2006;1(1):3. Published 2006 Mar 9.
- Jensen D, Wallace S, Kelsay P. LATCH: A Breastfeeding charting system and documentation tool. *J Obstet Gynecol Neonatal Nurs*. 1994;23(10):P27-32.
- Herzhaft-Le Roy J, Xhignesse M, Gaboury I. Efficacy of an Osteopathic Treatment Coupled With Lactation Consultations for Infants' Biomechanical Sucking Difficulties. *J Hum Lact*. 2017;33(1).
- Vismara L, Manzotti A, Tarantino AG, et al. Timing of oral feeding changes in premature infants who underwent osteopathic manipulative treatment. *Complement Ther Med*. 2019;43:49-52.
- Patel S, Patel S. The effectiveness of lactation consultants and lactation counselors on breastfeeding outcomes. *J Hum Lact*. 2016;32(3):530-541.
- ClinicalTrials.gov [Internet]. Bethesda, MD: National Library of Medicine (US). 2019 May 10. Identifier NCT03945474, Osteopathic Manipulation in Breastfed Newborns; Accessed 2020 Jul 23. <https://clinicaltrials.gov/ct2/show/NCT03945474>
- Mohrbacher, N. *Breastfeeding answers made simple*. Hale Publishing, 2010.
- Riordan J, Wambach K. *Breastfeeding and Human Lactation 4th Edition*. Sudbury, MA, Jones and Bartlett Publishers, 2010.
- The Academy of Breastfeeding Medicine Protocol Committee. ABM Clinical Protocol #4: Mastitis Breastfeed Med. Sep 2008.177-180. <http://doi.org/10.1089/bfm.2008.9993>
- Anderson L, Kynoch K, Kildea S, Lee N. Effectiveness of breast massage for the treatment of women with breastfeeding problems: a systematic review. *JBI Database System Rev Implement Rep*. 2019;17(8):1668-1694. doi:10.11124/JBISIR-2017-003932
- Cotterman KJ. Reverse pressure softening: A simple tool to prepare areola for easier latching during engorgement. *J Hum Lact*. 2004;20(2):227-237.
- Chila A, et al. *Foundations for Osteopathic Medicine*. 3rd Ed. Lippincott Williams & Wilkins; 2010.
- Chikly B. *Silent Waves: Theory and practice of lymph drainage and therapy*, 2nd Ed. I.H.H Publishing; 2004.
- Berens P, Eglash A, Malloy M, Steube AM. ABM Clinical Protocol #26: Persistent Pain with Breastfeeding. *Breastfeed Med*. 2016;11(2):46-53.
- Santos KJ da S, Santana GS, Vieira T de O, Santos CA de ST, Giugliani ERJ, Vieira GO. Prevalence and factors associated with cracked nipples in the first month postpartum. *BMC Pregnancy and Childbirth*. 2016; 16:209. doi:10.1186/s12884-016-0999-4
- Kent JC, Mitoulas LR, Cregan MD, Ramsay DT, Doherty DA, Hartmann PE. Volume and frequency of breastfeedings and fat content of breast milk throughout the day. *Pediatrics*. 2006;117(3):e387-e395.
- Deng X, McLaren M. Using 24-hour weight as reference for weight loss calculation reduces supplementation and promotes exclusive breastfeeding in infants born by cesarean section. *Breastfeed Med*. 2018;13(2):128-134. doi: 10.1089/bfm.2017.0124
- Penn State Hershey Medical Center. Newborn Weight Tool. <https://www.newbornweight.org/>. Accessed June 22, 2021.
- U.S. National Library of Medicine. Neonatal weight gain and nutrition. <https://medlineplus.gov/ency/article/007302.htm>. Accessed June 22, 2021.
- Kent JC, Mitoulas LR, Cregan MD, Ramsay DT, Doherty DA, Hartmann PE. Volume and frequency of breastfeedings and fat content of breast milk throughout the day. *Pediatrics*. 2006;117(3):e387-e395.
- Aney M. 'Babywise' advice linked to dehydration, failure to thrive. *AAP News*. 1998;14(4):21. <https://www.aapublications.org/content/14/4/21>
- Mohrbacher N. The magic number and long-term milk production. *Clinical Lactation*. 2011;2(1)15-18. doi:10.1891/215805311807011827
- Kellams A, Harrel C, Omega C, Gregory C, Rosen-Carole C, and the Academy of Breastfeeding Medicine. ABM clinical protocol #3: Supplementary feedings in the healthy term breastfed neonate. *Breastfeed Med*. 2017;12(4). doi:10.1089/bfm.2017.29038.ajk
- Brodrribb W. ABM clinical Protocol #9: Use of Galactagogues in initiating or augmenting maternal milk production. *Breastfeed Med*. 2018;13(5):307-314. doi:10.1089/bfm.2018.29092.wjb
- Mortel M, Mehta SD. Systematic review of the efficacy of herbal galactagogues. *J Hum Lact*. 2013;29(2):154-162. doi:10.1177/0890334413477243
- Hassiotou F, Geddes D. Anatomy of the Human Mammary Gland: Current Status of Knowledge. *Clin Anat*. 2013; 26:29-48. doi:10.1002/ca.22165
- Conaway EM, O'Donnell AE. Osteopathic considerations for breastfeeding women. *J Osteopath Med*. 2021;121(10):805-811. doi:10.1515/jom-2021-0069
- Stranding S. Chest wall and Breast. *Gray's Anatomy 41st Ed*. Elsevier; 2016. Chapter 53, 931-952
- ClinicalTrials.gov [Internet]. Bethesda, MD: National Library of Medicine (US). 2019 March 15. Identifier NCT03875794, OMILQ: Osteopathic Manipulation to Increase Lactation Quantity (OMILQ); Accessed 2020 Jul 23. <https://clinicaltrials.gov/ct2/show/NCT03875794>
- Johnson HM, Eglash A, Mitchell KB, et al. ABM Clinical Protocol #32: Management of Hyperlactation. *Breastfeed Med*. 2020;15(3):129-134. doi:10.1089/bfm.2019.29141.hmj
- Eglash A. Treatment of maternal hypergalactia. *Breastfeed Med*. 2014;9(9):423-425. doi:10.1089/bfm.2014.0133
- Lawrence RA. *Breastfeeding: A guide for the medical profession*, 2nd ed. C.V. Mosby. 1985;203.
- Drugs and Lactation Database (LactMed) [Internet]. Bethesda (MD): National Library of Medicine (US); 2006-. Lecithin. [Updated 2019 Oct 23]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK501772/>
- The Academy of Breastfeeding Medicine Protocol Committee. ABM clinical protocol #4: mastitis. *Breastfeed Med*. 2008:177-180. <http://doi.org/10.1089/bfm.2008.9993>
- Jackson C, Loveless B. The use of osteopathic manipulative medicine in the management of recurrent mastitis. *J Am Osteopath Assoc*. 2020;120(12):921-925. doi:10.7556/jaoa.2020.143
- Berens P, Eglash A, Malloy M, Steube AM. ABM Clinical Protocol #26: Persistent Pain with Breastfeeding. *Breastfeed Med*. 2016;11(2):46-53. doi:10.1089/bfm.2016.29002.pjb
- Alive and Thrive. Cost of Not Breastfeeding Tool. https://www.aliveandthrive.org/country-stat/usa/#ec_children. Accessed April 22, 2021.
- Buechner M. The cost of not breastfeeding. UNICEF. Aug 2019. <https://www.unicefusa.org/stories/cost-not-breastfeeding/36187>. Accessed April 22, 2021.
- Academy of Breastfeeding medicine protocols. <https://www.bfmed.org/protocols>. Accessed July 23, 2020.

JOIN OUR GROWING TEAM

NOW HIRING FULL-TIME

PRIMARY CARE FACULTY AND OPP FACULTY



Lisa Chun, DO



Paula Gregory, DO



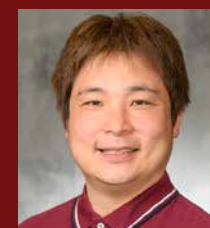
Terri Turner, DO



Krista Lund, DO



Lindsey Faucette, DO



Yoshihiro Ozaki, DO



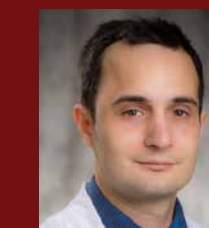
Sundeep Grewal, DO



Larry Miller, DO



Jared Ham-Ying, DO



Alexander Frantzis, DO

Learn more at
chsu.edu/employment-opportunities

CHSU.edu    

CHSU CALIFORNIA
 HEALTH SCIENCES
 UNIVERSITY

COLLEGE OF OSTEOPATHIC MEDICINE

REVIEW ARTICLE

OSTEOARTHRITIS DISEASE PROGRESSION THROUGH THE LOWER EXTREMITY: A REVIEW

David B. Canton, DO, MPH, JD¹; Michael A. Conte, DO¹; Pamela Kammen, MD¹

¹California Health Sciences University College of Osteopathic Medicine, Clovis, CA

KEYWORDS:

Kinetic chain

OMT

Osteoarthritis

Osteoarthritis of the lower extremity

It has long been felt that osteoarthritis is the result of wear and tear. Many physicians are not aware that biological science has now validated that this increased “wear and tear” on the joint is the result of loading-induced stresses that undermine cell function and aging. The loading creates shear forces on the cartilage that leads to increased oxidants. These oxidants then cause chondrocyte premature aging, leading to the development of what we know as osteoarthritis.

Studies have also found a significant association between foot pain and knee and hip pain. Likewise, many physicians are not aware of the relationship between the hip, knee and foot are a result of the kinetic chain. The kinetic chain being the dynamic transfer of forces during ambulation of the foot, ankle, knee, and hip. The kinetic chain explains how the body’s joints and segments affect one another during movement, and so play a role in pain. The pain results from transferred mechanical stress from one joint to another. The same stress and shear forces that leads to osteoarthritis.

This article involves a literature of the connection of osteoarthritis and the kinetic chain in the lower limb and highlights the need to consider related joints in the kinetic chain when addressing and injury in one joint to address and perhaps delay progression of osteoarthritis in related joints.

INTRODUCTION

Osteoarthritis (OA) is the leading arthritic condition worldwide.¹ Nearly 1 million people were hospitalized for osteoarthritis in the United States in 2011.¹ The cost to care for these patients—at almost \$15 billion—elevated it to the position of second most expensive disease in the country.¹ In 2013, OA was the second most costly health condition treated in U.S. hospitals, in that it accounted for \$16.5 billion.² OA is most often found in the knee joint, while the hand and the hip are the next most common areas to be affected.³ The authors questioned if the osteopathic tenets would explain progression and perhaps management of OA. This article will review the results of the Medline literature search and discuss possible application of osteopathic manipulative treatment (OMT).

METHODS

Applying osteopathic tenets of body connectedness, one would expect that OA of one joint in the lower extremity would transfer forces to the opposite extremity as a compensatory mechanism. Therefore, a Medline/PubMed literature search

CORRESPONDENCE:

David B. Canton, DO, MPH, JD | dave.canton123@gmail.com

was performed using the search phrase “association between knee and contralateral hip osteoarthritis.” The search returned 68 articles between 1981 and 2021. These were then reviewed for relevance to the question. Those that addressed association or disassociation of OA and ipsilateral joint are included in the discussion.

Because association is not causation, a separate, second PubMed search was performed looking for a biochemical/physical force cause for OA. The intent of the search was to identify a biochemical explanation for the association found in the first search. The search returned 538 articles between 2001 and 2021. These were also reviewed for relevance to the question of causation. Of note, most of the research has been related to risk factors and genetic predisposition. Those articles addressing biochemical or biomechanical causes were included in the discussion.

RESULTS/DISCUSSION

It has long been believed that OA is the result of wear and tear on a joint.⁴ Research into occupations that include strenuous physical labor suggests an association between repeated and intense episodes of joint loading with the early onset of joint degeneration. Additionally, an increased risk for the development of OA has been associated with sports that involve repeated exposures to high joint-loading activity.⁵ Newer studies have demonstrated that the pathophysiology of OA is somewhat more complex and other considerations must be taken into account. A myriad of factors contributes to the destruction of joint cartilage,

including inflammatory, metabolic and mechanical etiologies.³ However, it appears that all factors contribute to mechanical forces on joint surfaces.

In evaluating the mechanical forces, cellular studies have demonstrated the association of shear force on the chondrocyte with the release of multiple biochemical factors that can lead to oxidation, inflammation, decreased metabolic activity, early aging and chondrocyte cell death.⁵ Thus, at the cellular level, it is the development of shear forces on the joint that appears to lead to the development and progression of OA.

For osteopathic clinicians, it is also helpful to consider how these processes could impact the patient, beyond just a single joint. The motion paradigm of the kinetic chain can provide insight into this bigger picture. The kinetic chain concept, specifically the kinetic chain reaction, has been attributed to Franz Reuleaux (1829–1905). He proposed a system of overlapping rigid segments connected by pin joints whereby, fixed at each end, application of an external force results in a chain reaction, with each segment receiving and transmitting force to the next segment in the system.⁶ The concept has been adapted over time to the human body, where it has been described as “a sequencing of individual body segments and joints to accomplish a task.”⁷

In the gait cycle, contact with the ground begins at heel strike,⁸ beginning the process of directing forces through the lower extremity. When looking at the lower extremity, the relationship between the toes, foot, ankle, lower leg, knee, upper leg, hip, pelvis and spine comprises the kinetic chain. To evaluate the secondary biomechanical effects of knee gait mechanics, investigators studied ipsilateral hip and ankle joint motion among patients with knee OA against a control group. This would be a marker for potential transfer of forces onto the follow-on affected joint in OA patients. Results showed that the range of motion (ROM) of the hip and ankle joints were significantly smaller in the OA group and were associated with limited ROM of the knee joint (both $p < 0.001$). The authors concluded that OA of the knee has a negative effect on the ROM of both the hip and ankle.⁹

Another study looked at the pattern of evolution of end-stage lower extremity OA in a clinical cohort of 5894 patients. The study used total joint replacement as the marker of end-stage OA. Investigators selected patients who underwent hip or knee replacement and evaluated the relative likelihood those patients would have a subsequent total joint replacement. Since mechanical processes are not the primary driving force behind the pathology seen in rheumatoid arthritis (RA), RA patients were used as a control population. In OA patients undergoing a second joint replacement, these individuals were significantly more likely to have contralateral limb joint affected (hip to knee $p < 0.001$; knee to hip $p = 0.013$), whereas the RA patients did not show any pattern of laterality.¹⁰ A subsequent study expanded on the concept, investigating 85,616 patients who had either a total knee, total hip, or total shoulder arthroplasty. The authors found that 23.6% of the patients went on to have the contralateral joint replaced 5–8 years later, while 3.7% had a different joint replaced in that same timeframe.¹¹ Thinking of these results in the context of the kinetic chain, it is understandable that injurious forces causing damage at one joint may be distributed throughout the chain, causing damage to other joints.

In follow-up to the findings that the contralateral knee was more likely to require knee replacement after total hip replacement, investigators examined whether the finding was related to asymmetries in dynamic loading at the knee joint. Specifically, the investigators assessed increases in the peak external knee adduction moment, as this has been associated with disease progression in knee OA. Fifty individuals had their gait analyzed prior to the total hip replacement, and 22 of them were reevaluated 10–23 months after surgery. At each evaluation, dynamic joint loads were compared between the contralateral and ipsilateral knees. Peak external knee adduction moment and peak medial compartment load were increased in the contralateral knee, persisting post-operatively.¹² This further exemplifies the concept of the kinetic chain and force distribution throughout the different elements of that system.

CONCLUSION

Typical management of OA has involved symptomatic treatment of pain with non-steroidal anti-inflammatory drugs (NSAIDs) until total joint replacement was deemed medically necessary. Exercise is encouraged, but is difficult to implement, as insufficient exercise is not helpful and too much increases pain.¹³ It has been suggested that the standard recommendation of resistance and weight-loaded exercises (such as walking and exercise bicycles) that involve repeated short-arc motions could actually decrease joint mobility and continue to propagate the gait disturbances noted around the kinetic chain, as they would be similar to the repetitive motions seen in work- and sport-related activities implicated in the type of joint damage, which leads to OA.¹⁴ Given the biochemical nature of OA and the impact of the kinetic chain on connected joints, an argument could be made for enhanced physical therapy after joint injuries (for example, ankle sprains or strains) to correct or prevent establishment of compensatory but destructive gait disturbances that perpetuate the progression of OA. In response to clinical findings of gait dysfunction and OA, it makes sense that physicians should ensure that there is a focus on restoration of the gait, and not just ROM and strengthening of the affected joint, in physical therapy efforts. Considering these kinetic chain mechanics, there is logic to the addition of manual therapy, including the use of OMT, to reduce shear forces applied to the joints to perhaps reduce or delay the progression of OA.¹⁴

The interrelationship of structure and function in the human body is a central osteopathic tenet.¹⁵ Along with the concept of somatic dysfunction,¹⁶ these foundational principles of osteopathic medicine correlate with the concepts discussed above—mechanical stressors lead to joint damage leading to further joint damage. Using OMT to treat arthrodiastasis and myofascial somatic dysfunctions will, by definition, improve positional asymmetry and remove restrictions to joint range of motion. These improvements in joint function translate to a reduction of strain/shear forces on the joint, the type that the literature discussion above states will lead to joint damage and progression of OA. Specific techniques to address these types of somatic dysfunction include muscle energy, counterstrain, myofascial release, high-velocity, low amplitude (HVLA), and articular techniques. These technique methods are components of a comprehensive osteopathic principles and practice/osteopathic manipulative medicine (OPP/OMM),

and the majority are required to be taught in the osteopathic medical student curriculum.¹⁷ Therefore, these techniques are in the wheelhouse of most osteopathic physicians and are easy to apply in outpatient primary care, as well as other clinical settings. Studies looking at knee OA, for example, have shown improvements in range of motion, joint function, and pain after manual manipulation to the knee (including bony articular, axial traction, oscillatory mobilization and fascial/vascular manipulative techniques).¹⁸ Given the impact of OA on the lower extremity, there is room for the physician to make significant improvement on patient morbidity and quality of life, while potentially reducing financial healthcare burdens related to this disease process.

Funding and Disclosures: The authors received no financial support related to this submission and have no financial affiliations or conflict of interest related to this article to disclose.

REFERENCES

1. Sen R, Hurley JA. Osteoarthritis. In: *StatPearls*. StatPearls Publishing; August 19, 2021. PMID: 29493951
2. The Cost of Arthritis in US Adults; Centers for Disease Control and Prevention; https://www.cdc.gov/arthritis/data_statistics/cost.htm; February 27, 2020. Accessed February 2, 2021
3. Hunter DJ, Bierma-Zeinstra S. Osteoarthritis. *Lancet*. 2019;393(10182):1745–1759. doi:10.1016/S0140-6736(19)30417-9
4. Barnett R. Osteoarthritis. *Lancet*. 2018;391(10134):1985. doi:10.1016/S0140-6736(18)31064-X
5. Buckwalter JA, Anderson DD, Brown TD, Tochigi Y, Martin JA. The roles of mechanical stresses in the pathogenesis of osteoarthritis: Implications for treatment of joint injuries. *Cartilage*. 2013;4(4):286–294. doi:10.1177/1947603513495889
6. Karandikar N, Vargas OOO. Kinetic chains: A review of the concept and its clinical applications. *PM R*. 2011;3(8):739–745. doi:10.1016/j.pmrj.2011.02.021
7. Kuchera ML, et al. Osteopathic approaches to diagnosing and treating somatic dysfunction in the extremities: Osteopathic patient management. In: *Foundations of Osteopathic Medicine: Philosophy, Science, Clinical Applications and Research*. 4th ed. Wolters Kluwer, 2018.
8. Kuchera ML. Osteopathic considerations in sports medicine: Lower extremities. In: *Foundations of Osteopathic Medicine: Philosophy, Science, Clinical Applications and Research*. 4th ed. Wolters Kluwer, 2018.
9. Ro DH, Lee J, Lee J, Park J-Y, Han H-S, Lee MC. Effects of knee osteoarthritis on hip and ankle gait mechanics. *Adv Orthop*. 2019;2019:9757369. doi:10.1155/2019/9757369
10. Shakoore N, Block JA, Shott S, Case JP. Nonrandom evolution of end-stage osteoarthritis of the lower limbs. *Arthritis Rheum*. 2002;46(12):3185–3189. doi:10.1002/art.10649
11. Lamplot JD, Bansal A, Nguyen JT, Brophy RH. Risk of subsequent joint arthroplasty in contralateral or different joint after index shoulder, hip, or knee arthroplasty: Association with index joint, demographics, and patient-specific factors. *J Bone Joint Surg Am*. 2018;100(20):1750–1756. doi:10.2106/JBJS.17.00948
12. Shakoore N, Hurwitz DE, Block JA, Shott S, Case JP. Asymmetric knee loading in advanced unilateral hip osteoarthritis. *Arthritis Rheum*. 2003;48(6):1556–1561. doi:10.1002/art.11034
13. Treatment Guidelines for Osteoarthritis, Arthritis Foundation, <https://www.arthritis.org/diseases/more-about/guidelines-for-osteoarthritis-treatments>, accessed December 15, 2020
14. Wade GJ. Rethinking the model of osteoarthritis: A clinical viewpoint. *J Am Osteopath Assoc*. 2011;111(11):631–637. PMID:22104515
15. Seffinger MA, et al. Philosophy of osteopathic medicine: The educational council on osteopathic principles. In: *Foundations of Osteopathic Medicine: Philosophy, Science, Clinical Applications and Research*. 4th ed. Wolters Kluwer, 2018.
16. Somatic dysfunction. In: *Glossary of Osteopathic Terminology*. 3rd ed. American Association of Colleges of Osteopathic Medicine; 2017:63.
17. Introduction and Disclaimer. In: *A Teaching Guide for Osteopathic Manipulative Medicine*. 2nd ed. American Association of Colleges of Osteopathic Medicine; 2018:1.
18. Snider K. Dysfunction in a patient with acute knee pain and osteoarthritis: A case report. *The AAO Journal*. 2015;25(2):27–32.

BRIEF REPORT

GENERATIONAL DIFFERENCES IN COMMUNICATION AND TRANSLATION TO MEDICAL EDUCATION

Shannon Ramsey Jimenez DO, FACOFP¹; Haley Ford-Wilcox, MS¹

¹Sam Houston State University College of Osteopathic Medicine Department of Primary Care and Clinical Medicine, Conroe, TX

KEYWORDS:

Communication

Generation

Preceptors

Students

Context: Each generation has special characteristics brought out by the times in which they have lived, which have affected the way they communicate in both reception and expression of information.

Objectives: This article looks at key differences between the generations and discusses their application to medical education. Both older generations, as well as younger generations, will be discussed.

Methods: The initial research for this review was started in March 2020 as part of a preceptor podcast series. Both listed authors participated in the literature search and assimilation. Articles reviewed came from various resources included the Pew Institute, marketing or communication companies, and universities.

Results: This article outlines many differences as well as some similarities between the 5 unique working generations. Some of these characteristics include stoicism, altruism, idealism and beneficence.

Conclusions: Keeping these typical characteristics in mind, however, when interacting with members of these generations can improve communication all around. In medical education, improved communication can facilitate better learning and more productive and pleasant experiences for the teacher and the learner.

INTRODUCTION

Five generations are currently living together on the planet, and each generation is of the age to have formed their own opinions and expectations. The different generations include: the traditional generation (born before 1945), baby boomers (born between 1945 and 1965), generation X (born between 1965 and 1980), generation Y, also known as Millennials (born between 1980 and 2000) and generation Z (born between 2000 and the 2010s).¹ Each generation has special characteristics brought out by the times in which they have lived. These characteristics in turn affected the way they communicate in both reception and expression of information. The following article looks at key differences between the generations and discusses their application to medical education. Both older generations, as well as younger generations, will be discussed, as many educators will

fall into the older generations. For educators to better understand medical students, educators need to first understand themselves. Everyone views the world through the lens of their own personal histories. Being mindful of these generalities can help us communicate more effectively. For each generation, there will be a brief synopsis of characteristics followed by communication suggestions for preceptors and students. The purpose of this report is to improve preceptor-learner communication. However, the knowledge shared can carry over into many other coaching or mentoring situations.

RESULTS AND DISCUSSION

The traditional generation

The traditional generation, those born before 1945, was shaped by the Great Depression and World War II, among other events. They have been described as “emotionally conservative,” which is one reason they are also called the “Silent Generation.”² They tend to be disciplined, more formal and have a keen sense of duty. Traditionals like to follow the chain of command and prefer to make decisions based on what worked in the past, but they still seek out technological advances. They value respect, stability, privacy, integrity, order, consistency, effective communication

CORRESPONDENCE:

Shannon Ramsey Jimenez, DO, FACOFP | Srj033@shsu.edu

Copyright© 2022 by the American College of Osteopathic Family Physicians. All rights reserved. Print ISSN: 1877-573X doi:10.33181/13068

skills and dues payment. Traditionals are loyal workers who are highly dedicated, risk averse and committed to teamwork and collaboration.² They want satisfying work opportunities that are stable, and they appreciate the personal touch such as handwritten notes.¹

PRECEPTORS

Preceptors from the traditional generation should try to understand that the formality and stoicism of their generation seem old-fashioned to younger generations, and it means less to them than meaningful or genuine interactions. Also, while paying your dues is important to traditionals, younger generations believe if you are talented and work hard, then you should be given a chance to prove yourself. However, traditionals, Millennials, and generation Z do have a trait in common: their sense of duty. While traditionals' sense of duty is more targeted to their country or employer, generation Z's sense of duty is more targeted at a cause. Younger generations and older generations are both proud of their work, but older generations are proud of the work product, and younger generations are prouder of the experience. All generations mention wanting to contribute to the greater good as well.

STUDENTS

When communicating with the traditional generation, students should understand that a few well-chosen words of appreciation mean more to this generation. Showing respect is important to them. They expect students to work hard, to not complain and to not look for a lot of recognition. However, when traditionals do give someone praise, it is short but genuine and meaningful.

When communicating with preceptors, students should be relatively formal and direct but respectful. Do not expect a lot of positive feedback but when you get a few words of it, know it is meaningful. Appeal to their sense of duty. Be direct but polite. As they appreciate actions more than words, consider making a small card with a thank you. You may also consider doing something that saves them time, like gathering a patient's history or test results before they get in or while they are doing something else.

Baby boomers

The baby boomer generation consists of those born between 1945 and 1965, although the exact years vary slightly depending on the source. This generation witnessed and partook in the political and social turmoil of their time: the Vietnam War, the Civil Rights Movement, the John F. Kennedy and Dr. Martin Luther King, Jr. assassinations, as well as Woodstock and the freewheeling 1960s.² Baby boomers grew up in an era of prosperity and optimism, bolstered by a sense that they are a special generation capable of changing the world. They respect authority but do not always trust it. Many are accepting of diversity, more politically liberal, conflict avoidant, and relationship oriented. They have a fierce sense of right and wrong and love a noble cause. Baby boomers have been described as the "Show Me Generation," which translates to words meaning little to them and actions meaning more.²

PRECEPTORS

The baby boomer generation will tend to look on the bright side and hold back criticism due to their optimism and conflict avoidance. However, because actions mean more to baby boomers than words, their verbal or written communication can come across as being insensitive and harsh to younger generations as the younger generation value words more. Being mindful of their words and avoiding "you" terms that can be interpreted as a personal attack is helpful. If they must give negative feedback, addressing the action and not the person is interpreted less harshly.

STUDENTS

When communicating with baby boomer generation, one should be diplomatic as to not come off confrontational. Confrontation can be interpreted as disrespect, which is something this generation will not tolerate well. Since they value actions, students should work hard and point out what their actions mean. Speak up if you have ideas, as boomers enjoy innovation. Keep a higher ground stance and appeal to their sense of right and wrong.

Generation X

Generation X (also known as Gen Xers) are those born between approximately 1965 and 1980. In a manuscript from the University of Minnesota, A. Tolbize (2008) noted that Gen Xers grew up in a period of financial, familial and societal insecurity associated with an immense recession. They witnessed their parents being laid off along with the decline of the American global power. Additionally, Gen Xers grew up with a stagnant job market and corporate downsizing with limited wage mobility, making them the first individuals predicted to earn less than their parents did.² They grew up in homes where both parents worked, which created a latch-key kid generation where they were obligated to fend for themselves. They were influenced by music television, the HIV/AIDS epidemic, the fall of the Berlin Wall and their mantra in high school was question authority, because they felt authority had let them down.³

Due to their economic hardships, Gen Xers started to walk away from the workaholic lifestyle of the previous generation.² They value a balance between work and life, are fiercely independent, entrepreneurial, pragmatic and creative. They value actions more than words, and accomplishment more than money.

PRECEPTORS

Much like the boomers, a Gen Xer's words may come out harsh to younger generations at times. They tend to be straight to the point and less formal. They will notice when a student is trying their best or putting in more hours and be more likely to acknowledge hard work over intelligence. Being mindful of these personal tendencies will hopefully help mitigate them. Learning to give impersonal, balanced feedback with positive reinforcement and not only what the student does wrong can make interactions more meaningful.

STUDENTS

When communicating with the Gen X generation, be direct and practical. Do not be afraid to share ideas. As mentioned previously, Xers appreciate innovation. Students should show some independence and initiative, like looking things up before they are

told or finding a patient's test results that they know the preceptor is awaiting. Asking thoughtful questions also shows that students are listening and trying to learn and not just going through the motions or biding time until they can leave. Preceptors can tell who is really trying and who is not.

Generation Y aka Millennials

Millennials are those born 1980–2000, depending on the source. They are predicted to make up 75% of the workforce by 2025.¹ This generation has been shaped by parental excesses, computers with dramatic technological advances and relative peace. As a result, Millennials are optimistic idealists. They value respect, being heard, dedication and they want leaders who display these qualities. Millennials hold steadfast to ideas or causes but not as much to people or employers.² They value meaning and validation, and they want to contribute positively to the world.

Due to having increased interaction with technology, words mean more to this group, and they are more idealistic than their predecessors.² Millennials desire a more balanced life that the Xers and have been characterized as "demanding" because they have a high expectation of those in authority.²

PRECEPTORS

Millennials have grown up in an increasingly multicultural society and appreciate diversity. They grew up with technology, change and political turmoil, so they are adept at going with the flow. Millennials are now the largest generation, because the baby boomer population is shrinking.¹ They are much more politically and socially liberal, as well as connected digitally. Because of the significant digital communication that they have grown up with, they are used to things being clear and categorized, and they prefer it that way. For example, an educator may be teaching a millennial something all day, but if the educator does not say "I am going to teach you now," it could be possible that the point is missed completely by the Millennial because they may not realize what is happening. The intention of using specific words to relay what is happening or what needs to be observed by the student allows for better understanding because it is made clear to the learner at the beginning.

Millennials tend to expect a quick return of information. For example, if a millennial sends a presentation to an educator via email, they will expect an acknowledgement of receipt. They much prefer digital communication rather than phone calls, which can cause anxiety as they interrupt their day. Communication via phone may be more reactive and does not allow for well-thought-out ideas. They are likely to return emails on the weekend or at night because they view emails as less urgent than text.⁴ Millennials also tend to be less formal in their communication and seek connectivity with their coworkers and boss, even outside of work. This may be more difficult for older physicians because they were trained to view this as taboo and keep professional boundaries. It is acceptable to continue to lay firm boundaries but be sure to clearly articulate the reason with positive communication. As mentioned previously, they appreciate validation and knowing they are contributing to the betterment of the world as well. Therefore, their contributions

should be acknowledged or pointed out to them if they cannot see it for themselves. Feedback, especially if negative, should be framed as helping to make them better for their future patients and the greater good.

STUDENTS

As students in this generation, it is important to "know thyself," as well as understand where your preceptors are coming from. While you are likely to be more technologically advanced than many of your preceptors due to your exposure, keep in mind that the generations before you did a lot more with a lot less of the technological advances that you have had the opportunity to know. Respect their contribution, just like you want them to respect yours. If your preceptor does not email or text you back right away or accept an invitation, it does not mean that they are ignoring you or do not like you. They just are more comfortable with a more distinct set of boundaries. However, if they do reach out to you by email or text or phone, they must think it is important, so respond as soon as reasonable.

Generation Z

Generation Z or Gen Z are people born around 1995–2010. They are just now entering the job market, so their characteristics are not yet fully known. They are called "digital natives" because they have known technology since they were born. They are deeply attached to technology and expect employers and schools to embrace it. Due to witnessing turbulent times and political turmoil, Gen Z has less trust for authority and believes respect is earned—much like traditionals. They value meaning and are motivated to contribute positively to the world. Members of Gen Z are technological idealists and social justice warriors.⁵

Generation Z is the most racially and ethnically diverse in history.^{6,7} While they embrace diversity and expect their leaders to do the same, their perception of the world is smaller because of technology, using technology for communication more than any other generation. However, 72% of Gen Z workers prefer face-to-face communication at work, 11% prefer texts and 9% percent prefer email.⁸ Another study found that Gen Z respondents were more likely than technology-obsessed Millennials to value face-to-face communication, with an emphasis on effectiveness over convenience.⁹

PRECEPTORS

A study by The Center for Generational Kinetics found that 60% of Gen Z members prefer multiple check-ins with the boss during the week, and 40% of those workers would prefer that those check-ins to happen at least daily.⁸ If these check-ins and interactions do not happen regularly, a Gen Z worker is likely to think that they have done something wrong.¹⁰ Therefore, professors and preceptors should understand that this generation will request frequent and instant feedback, although it does not have to be lengthy. A few words of affirmation or correction will suffice, and it may be beneficial to carve out a set time at the beginning or end of the day to give more formal feedback. Appeal to their beneficence and point out how they are contributing to the good of their patient or the community.

STUDENTS

Try not to stereotype your preceptors as “less connected” or in tune with technology, even though they may be. Gen Z’s characteristics are a lot more like those of Gen X than one may think in that both like direct face-to-face communication and value innovative ideas. Preceptors tend to be busy, and they want to teach, or they would not have signed up. If they cannot give you the feedback or attention you feel you need exactly when you feel you need it, be patient. Perhaps ask for a few minutes to discuss something at the end of the day or after you have had a chance to find it yourself. Offer to research new findings or guidelines and share them. Ask well thought out questions and try to look things up while you are waiting, ensuring you avoid doing so while with a patient or while someone is talking to you as that can come off as disrespectful, if they are unsure what you are doing.

CONCLUSION

While this report focused on the differences between the generations, it is notable that several generations have similar descriptors, although the magnitude of how much that descriptor applies is what changes over time. For example, traditionals, boomers and Gen Xers, all value action more than words, but that characteristic became less prominent over time. While Millennials and Gen Z both value words more than actions, it seems more prominent in Gen Z so far. It is also notable that beneficence is a common thread throughout the generations. It seems wanting to know that we are contributing to the greater good is a universal attribute.

Because empathy comes from being able to put oneself into another person’s shoes, understanding each other’s backgrounds that contribute to our personality traits will contribute to our empathy as well. This will hopefully improve our communication and, therefore, our teaching results. Knowledge of generational differences can also be used by students and preceptors in their communication with patients, ultimately improving patient care as well.

These are broad generalizations, and other factors—such as personality type, cultural background and personal history—may keep some people from being stereotypically like the rest of their generation, which is why getting to know learners by asking them about themselves and their goals is important for both the teacher and the learner. Keeping these typical characteristics in mind when interacting with members of these generations, however, can improve communication all around. In medical education, improved communication can facilitate better learning and more productive and pleasant experiences for the teacher and the learner.

Disclosures and Funding: The authors received no financial support related to this submission and have no financial affiliations or conflict of interest related to this article to disclose.

REFERENCES:

1. Purdue University Global. Generational differences in the workplace. 2021. Accessed June 7, 2021. <https://www.purdueglobal.edu/education-partnerships/generational-workforce-differences-infographic/>
2. Tolbize A. Generational differences in the workplace. University of Minnesota Research and Training Center on Community Living. August 16, 2008. Accessed June 7, 2021. https://rtc.umn.edu/docs/2_18_Gen_diff_workplace.pdf
3. Phillips-Fein K. What’s left of generation X. Dissent Magazine. 2019. Accessed June 7, 2021. <https://www.dissentmagazine.org/article/whats-left-of-generation-x>
4. Alton L. Phone Calls, texts or email? Here’s how Millennials prefer to communicate. Forbes. May 11, 2017. Accessed June 7, 2021. <https://www.forbes.com/sites/larryalton/2017/05/11/how-do-millennials-prefer-to-communicate/>
5. Frances T, Hoefel F. ‘True gen’: Generation Z and its implications for companies. McKinsey & Company. November 12, 2018. Accessed June 7, 2021. <https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/true-gen-generation-z-and-its-implications-for-companies?cid=eml-web>
6. Western Governors University. Who is gen Z and how will they impact the workplace? February 17, 2021. Accessed June 7, 2021. <https://www.wgu.edu/blog/who-is-gen-z-how-they-impact-workplace1906.html>
7. Parker K, Graf N, Igielnik R. Generation Z looks a lot like Millennials on key social and political issues. Pew Research Center. January 17, 2019. Accessed June 7, 2021. <https://www.pewsocialtrends.org/2019/01/17/generation-z-looks-a-lot-like-millennials-on-key-social-and-political-issues>
8. Campiere A. How generation Z communicates at work. PCMA. February 14, 2019. Accessed June 7, 2021. <https://www.pcma.org/how-generation-z-communicates-work/>
9. Yozell Associates. Generation Z values face-to-face business communication. *Employee Benefits Newsletter*, 60(2). February 28, 2017. Accessed June 7, 2021. <http://yozell.com/blog/generation-z-values-face-face-business-communication>
10. The Center for Generational Kinetics. The state of Gen Z™ 2018: Annual study and key discoveries. 2018. Accessed June 7, 2021. <https://genhq.com/generation-z-research-2018>

CLINICAL IMAGE

SEIZURE-INDUCED THORACOCERVICOFACIAL PETECHIAE

Meaghan Standridge, MS-IV¹; Lindsay Tjiattas-Saleski, DO, MBA, FACOEP²

¹University of South Carolina – School of Medicine Greenville

²Edward Via College of Osteopathic Medicine – Carolinas Campus

A 31-year-old male presents with seizure activity and a diffuse rash. The patient has a known history of seizures beginning at age 11. He states that the previous day he developed lightheadedness, intermittent lapses in memory and malaise, so he went home from work and immediately went to sleep. When he woke up the next morning, he was lying on his right side covered in vomit, had urinated on himself and had a tongue laceration. He feels that he had a generalized seizure overnight but denies falling off his bed. He denies fevers, chills, chest pain, shortness of breath, headache or diarrhea. His daily medications include 500 mg of levetiracetam twice a day, but he indicates that when he starts to feel like he might have a seizure, he generally increases the dosage to 1000 mg twice a day. He took 1000 mg orally the morning of presentation. The patient also admits to a periorbital and anterior chest wall rash (Figures 1–3). He states the last time he developed this rash was about 2 years ago after a seizure.

FIGURE 1:



FIGURE 2:



FIGURE 3:



QUESTIONS:

1. What is the diagnosis of this patient?

- a. Henoch-Schönlein purpura
- b. Medication reaction
- c. Meningococemia
- d. Thoracocervicofacial petechiae
- e. Vitamin C deficiency

2. What would be an appropriate treatment option for this patient?

- a. Antihistamine
- b. Immediate IV ceftriaxone and vancomycin
- c. Supportive care
- d. Systemic corticosteroid therapy
- e. Vitamin C supplementation of 90 mg daily

ANSWERS:

1. What is the diagnosis of this patient?

Correct answer:

D) Thoracocervicofacial petechiae

Thoracocervicofacial petechiae is a petechial rash involving the anterior chest, the cervical region and areas on the face, particularly periorbital areas and the conjunctiva, that can occur after an epileptic seizure.¹⁻⁷ Henoch-Schönlein purpura (HSP) most commonly occurs in children following an upper respiratory

CORRESPONDENCE:

Lindsay Tjiattas-Saleski, DO, MBA, FACOEP |
ltjiattassaleski@carolinas.vcom.edu

infection and is characterized by a palpable purpura located on the extremities and buttock region.⁸ A medication reaction can present in numerous ways, most commonly being allergic in nature or urticarial.⁹ Meningococemia is caused by *N. meningitidis* and presents as acute meningitis with associated fever, generalized weakness, headache, petechial rash and hypotension.¹⁰ The patient in the clinical scenario did not exhibit any of the infectious symptoms associated with the petechial rash, thus making this diagnosis less likely. Severe Vitamin C deficiency, which is quite rare in the United States, can result in scurvy. Associated symptoms include petechial rashes, gingival hemorrhages and poor wound healing.¹¹

2. What would be the appropriate treatment option for this patient?

Correct answer:

C) Supportive care

The appropriate treatment for thoracocervicofacial petechiae is supportive care. It usually resolves within 3 weeks.^{3-5,7} Systemic corticosteroid therapy is appropriate for the treatment of HSP and has been shown to reduce the duration of skin lesions and gastrointestinal complications.⁸ It has not, however, been shown to prevent the recurrence of purpura with HSP.⁸ Should the patient be experiencing urticaria from a medication reaction, first-line therapy is antihistamines.¹² Intravenous ceftriaxone and vancomycin are empiric treatment for a patient with bacterial meningitis.¹³ The treatment of scurvy is up to 1000 mg of ascorbic acid (Vitamin C) daily in oral or IV form depending on illness severity.¹⁴

DISCUSSION:

Petechiae is a rash that can be very concerning clinically and a clue to potentially life-threatening illness. The rash can be caused by various infections, trauma, autoimmune conditions, hematologic disorders, asphyxiation and certain medications. However, thoracocervicofacial petechiae is a rare sequela of epileptic seizure activity and has been reported to follow generalized tonic-clonic seizures.^{1,2} Although the incidence of thoracocervicofacial petechiae is unknown, epilepsy syndrome is one of the most common brain conditions in the world, with more than 70 million people affected and a prevalence estimated at around 4–12 per 1000.^{15,16} Epilepsy also carries an increased risk of premature death and is associated with numerous other comorbidities that are important to identify.¹⁵ In a patient unaware of their own seizure diagnosis, thoracocervicofacial petechiae may be the only objective finding noted, or the only reason for which a patient presents for medical attention after seizure activity.

Petechial rashes develop via the leakage of erythrocytes from capillaries and result in small hemorrhages under the skin.³⁻⁸ A petechial rash, by definition, is 1 of 6 subtypes of purpura in which the lesions are non-palpable, not in a branching pattern (non-retiform) and >4 mm in diameter.⁸ The distribution and morphology of the purpuric lesions are important when trying to develop a differential diagnosis. In this patient, the rash was located primarily on the upper anterior portion of his body, helping to distinguish it from other known causes of life-threatening petechiae, which result in a more diffuse or differing pattern on presentation.

Petechiae is believed to occur following epileptic events due to the Valsalva maneuver-like response that occurs during the intense contraction of the chest and abdominal muscles.^{1,3,8} Seizure-induced petechial rashes are commonly reported to be observed in the anterior chest area, the cervical region and the conjunctival portion of the eye.¹⁻⁷ Although less commonly reported, the rash can also be observed in the periorbital region.⁵⁻⁷ Similar eruptions can appear after prolonged coughing or vomiting, supporting that the cause may have to do with markedly increased intrathoracic pressure due to intense contractions of the thoracic musculature against a closed glottis.⁷ A thoracocervicofacial petechial rash may be the only indicator of epileptic activity in a presenting patient.³ It is essential that this diagnosis be recognized due to the complexity and seriousness of epilepsy, although the rash itself appears to be self-limiting with no serious sequelae.^{3-5,7}

DIFFERENTIAL DIAGNOSIS

The differential diagnosis for a patient presenting with petechial rash is quite vast. The severity ranges from life-threatening to benign. Rash distribution and associated symptoms are helpful in delineating the cause.

Bacterial meningitis, specifically caused by *N. meningitidis*, must be ruled out quickly due to the mortality associated with such a diagnosis.^{10,17} In this case the petechial rash would usually involve the trunk, extremities and possibly the soles, palms and face typically following mucosal petechiae.¹⁸ A patient with meningococemia may also present with fever, myalgias, nuchal rigidity, headache and/or nausea.¹⁸ Meningitis is rapidly fatal, with mortality rates between 7% and 15% depending on the serotype, but only 60% of patients present with the classic symptoms of fever and petechiae.^{18,19}

Generalized petechiae can result from myelodysplastic syndrome (MDS), idiopathic thrombocytopenic purpura or drug-induced thrombocytopenia (DIT). The signs and symptoms of MDS are usually related to the pancytopenia that results from the bone marrow failure. These can include fever, fatigue, pallor and bruising.²⁰ ITP is an autoimmune condition that results in the self-destruction of platelets, potentially causing a generalized distribution of petechiae.²¹ DIT could be caused the medication causing destruction of platelets, or it could be an immune response to the drug that is causing the thrombocytopenia to occur.²² There are currently more than 200 drugs that are known to have caused DIT, including heparin, antibiotics, antiplatelet agents, antiepileptic agents and cardiac agents.²²

Periorbital and conjunctival petechiae can result from traumatic or sexual asphyxia.²³ Facial congestion, edema, cyanosis, abrasions and bruising are other potential associated findings.²³ It is important to consider this in a differential if there is not another major underlying cause, as it may identify if your patient is in an abusive or unsafe situation.²³

CONCLUSION

There are numerous causes for petechiae, varying from benign to life-threatening. The clinician needs to keep a broad differential in mind, while incorporating the presentation with the clinical signs and symptoms to conclude with an appropriate diagnosis. Seizure-induced thoracocervicofacial petechiae should remain in the differential for a patient who presents with the specific distribution noted in this clinical case. This clinical sign may be the only presenting feature of an underlying epileptic disorder, ultimately resulting in neurologic referral for appropriate long-term management, as the diagnosis is associated with numerous comorbidities and driving restrictions.^{3,15,24}

Disclosures and Funding: The authors received no financial support related to this submission and have no financial affiliations related to this article to disclose. Lindsay Tjiattas-Saleski, DO, MBA, FACOEP, is a member of the ACOFP Editorial Committee.

REFERENCES

- Rubegni P, Fimiani M, De Aloe G, Andreassi L, Rubegni M. Thoracocervical purpura as a single manifestation of epileptic seizure. *J Neurol Neurosurg Psychiatry*. 1998;65(3):365. doi:10.1136/jnnp.65.3.365
- Grunfeld J, Klein C. Seizure-induced purpura: A rare but useful clue. *Isr Med Assoc J*. 2001;3(10):779. PMID:11692558
- Van Geffen MWL, Joosten HMH, Stassen PM. Epilepsy under my skin? *BMJ Case Rep*. 2018;2018:bcr2017224136. doi:10.1136/bcr-2017-224136
- de Souza PVS, Bortholin T, de Rezende Pinto WBV, Santos AJ. Postictal thoracocervicofacial purpura. *Pract Neurol*. 2017;17(4):306. doi:10.1136/practneurol-2017-001633
- Roth P, Zumsteg D. Seizure-induced periorbital petechial rash. *Eur Neurol*. 2009;61(5):317. doi:10.1159/000206824
- Youssef J, Marty M, Navrátilová A, Deliac P, Morlat P. Purpuric rash revealing epilepsy. *Eur Neurol*. 2011;66(5):264. doi:10.1159/000331597
- Reis JJ, Kaplan PW. Postical hemifacial purpura. *Seizure*. 1998;7(4):337–339. doi:10.1016/s1059 1311(98)80029-0
- Wetter D, Dutz J, Shinkai K, Fox LP. Cutaneous vasculitis. In: Bologna JL, Schaffer J, Cerroni L, eds. *Dermatology*. 4th ed. Elsevier;2018:409–439.
- Duvic, M. Urticaria, drug hypersensitivity rashes, nodules and tumors, and atrophic diseases. In: Goldman L, Schafer AI. *Goldman's Cecil Medicine*. Elsevier; 2016: 2683–2695. doi:10.1016/B978-1-4377-1604-7.00448-6
- Stephens S, Apicella M. Neisseria meningitidis. In: Bennett JE, Dolin R, Blaser MJ. *Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases*. Elsevier/Churchill Livingstone; 2010:2737–2752.
- Patterson J. Metabolic and storage diseases. In: Weedon, D. *Weedon's Skin Pathology*. Elsevier/Churchill Livingstone; 2016:18:559–581.
- Habif T. Urticaria, angioedema, and pruritus. In: *Clinical Dermatology*. Elsevier; 2016:178–217.
- Stephens D. Neisseria Meningitidis infections. In: Goldman L, Schafer AI. *Goldman's Cecil Medicine*. Elsevier; 2016:1934–1940.
- Garhart BL, Nazareno AR, Ortega MQ. *Gahart's 2019 Intravenous Medications*. Elsevier; 2019:1–156.
- Thijs RD, Surges R, O'Brien TJ, Sander JW. Epilepsy in adults. *The Lancet*. 2019; 393(10172):689–701. doi: 10.1016/S0140-6736(18)32596-0

- Beghi E, Giussani G, Sander JW. The natural history and prognosis of epilepsy. *Epileptic Disord*. 2015;17(3):243–253. doi:10.1684/epd.2015.0751
- Cushing K, Cohn A. Meningococcal disease. In: *Manual for Surveillance of Vaccine Preventable Diseases*. Centers for Disease Control and Prevention; 2008.
- Cambria B, West L. Lethal rashes. *Physician Assistant Clinics*. 2017;2(3):371–384. doi:10.1016/j.cpha.2017.02.003
- Hsia RYJ, Wang E, Thanassi WT. Fever, abdominal pain, and leukopenia in a 13-year old: A case-based review of meningococemia. *J Emerg Med*. 2017;37(1):21–28. doi:10.1016/j.jemermed.2007.11.083
- Smith F, Dvorak C, Braun B, et al. Myelodysplastic syndromes and myeloproliferative neoplasms in children. In: Hoffman R, Benz EJ Jr, Silberstein LE, et al. *Hematology: Basic Principles and Practice*. Elsevier; 2018:994–1004.
- Abrams C. Thrombocytopenia. In: Goldman L, Schafer AI. *Goldman's Cecil Medicine*. Elsevier; 2016:1159–1167.
- Chong BH, Choi PYI, Khachigian L, Perdomo J. Drug-induced immune thrombocytopenia. *Hematol Oncol Clin North Am*. 2013;27(3):521–540. doi:10.1016/j.hoc.2013.02.003
- Reddy K, Lowenstein EJ. Forensics in dermatology: part II. *J Am Acad Dermatol*. 2011;64(5):811–814. doi:10.1016/j.jaad.2010.06.066
- Tatum WO, Worley AV, Selencia MLB. Disobedience and driving in patients with epilepsy. *Epilepsy Behav*. 2012;23(1):30–35. doi:10.1016/j.yebeh.2011.10.015

PATIENT EDUCATION HANDOUT



Joint Injections

Ariel Shafa, BS; Eli Eshaghian, BS; Amanda Frugoli, DO, FACP; Steven Barr, MD, FACP

Ronald Januchowski, DO, FACP, Editor • Paula Gregory, DO, MBA, CHCQM, FAHQ, FACP, Health Literacy Editor

Joint injections are commonly used to help reduce acute or chronic pain and inflammation in patients with arthritis. Common areas for joint injections include the knee, hip, shoulder and wrist. These procedures are usually completed in a clinician's office and may sometimes be completed with ultrasound guidance. Your provider will recommend the appropriate treatment for you based on your history. The medication is injected into the joint space using a small needle to help your pain and guide you to recovery.

TREATMENT OPTIONS

Steroid joint injections

Steroids can help reduce the inflammation around the joints, which should help relieve the pain. At the start of the procedure, local anesthesia will be injected superficially to keep the procedure as painless as possible. Following this, the physician will inject the steroid into the joint space.

Common steroids include methylprednisolone, triamcinolone and dexamethasone. The steroid of choice will be decided based on the specific joint.

Platelet-rich plasma injection

Platelet-rich plasma injection provides pain relief through the body's healing factors, as platelets contain many growth factors that can promote a faster healing process. The physician takes blood samples to fill a few test tubes. The tubes are centrifuged, allowing your platelets to be concentrated. The platelets from the tubes are then separated and used for the injection. Your doctor will advise you to stop taking anti-inflammatory medications a few days prior to the procedure to ensure the platelet growth factors can be optimized in their function.

Hyaluronic acid

The body naturally produces hyaluronic acid. It is a gel-like fluid found in the fluid surrounding joints and acts as a lubricant and shock absorber. Hyaluronic acid can also be injected into the knee, because increasing the lubrication around the knee may facilitate movement and reduce arthritic pain.

WHAT TO EXPECT

After the procedure, you will have minimal pain and can walk out of the office without needing a brace or a walking assistance device. For the first 48 hours, you should avoid excessive activity, such as jogging or heavy lifting. After this, you can return to normal work and home activities. If the injections are effective, they may be repeated after a period of time, usually 6 months.

PATIENT EDUCATION HANDOUT



Side effects

Immediately after, you may notice a local reaction such as pain, warmth and slight swelling. These symptoms should resolve in 1 day. You may want to apply an ice pack to help ease these symptoms. If they do not resolve, you will need to be re-evaluated.

Additional side effects may include:

- Skin or joint infection that could need evaluation and possible surgical drainage
- Local skin changes or discoloration that can be permanent
- Worsening pain or post-injection flares
- Tendon rupture

Sometimes, one injection fails to improve pain. If this happens, you may need repeated injections.

SOURCE(S):

1. Wehling P, Evans C, Wehling J, Maixner W. Effectiveness of intra-articular therapies in osteoarthritis: a literature review. *Ther Adv Musculoskeletal Dis.* 2017;9(8):183–196. doi:10.1177/1759720X17712695
2. Ayhan E, Kesmezacar H, Akgun I. Intraarticular injections (corticosteroid, hyaluronic acid, platelet rich plasma) for the knee osteoarthritis. *World J Orthop.* 2014;5(3):351–361. doi:10.5312/wjo.v5.i3.351

DOWNLOAD AND DISTRIBUTE

The PDF of this patient education handout is available for easy download and distribution to your patients at www.acofp.org/PEH.

The Osteopathic Family Physician Patient Handout is a public service of ACOFP. The information and recommendations appearing on this page are appropriate in many instances; however, they are not a substitute for medical diagnosis by a physician. For specific information concerning your medical condition, ACOFP suggests that you consult your family physician. This page may be photocopied noncommercially by physicians and other healthcare professionals to share with their patients.

DOWNLOAD AND DISTRIBUTE

The PDF of this patient education handout is available for easy download and distribution to your patients at www.acofp.org/PEH.

The Osteopathic Family Physician Patient Handout is a public service of ACOFP. The information and recommendations appearing on this page are appropriate in many instances; however, they are not a substitute for medical diagnosis by a physician. For specific information concerning your medical condition, ACOFP suggests that you consult your family physician. This page may be photocopied noncommercially by physicians and other healthcare professionals to share with their patients.

American College of Osteopathic Family Physicians
330 East Algonquin Road, Suite 1
Arlington Heights, IL 60005

Non-Profit Org.
U.S. Postage
PAID
Carol Stream, IL
PERMIT NO.
1746

OFFP