S3, E 20 — Research Roundup: Postural Differences May Impact Pain and Other Aspects of CP

**Dr. Marie McNeely** 00:01

Hello and welcome to Changing What's Possible: The Disability Innovation Podcast brought to you by Cerebral Palsy Alliance Research Foundation or CPARF. I'm your host, Dr Marie McNeely, and this season, we are excited to bring you cutting-edge stories and insights on research, technology, and innovation for people with CP and other disabilities. Our Research Roundup episodes can help you stay up to date on what's new in CP research. All of the studies featured in today's Research Roundup represent interesting, innovative work happening in the CP research space, outside of the projects that CPARF has funded.

Today, I'm going to share three new research papers focused on relationships between posture and other aspects of CP, like pain, balance, and quality of life. We know that symptoms of CP, like weakness and spasms, can lead to musculoskeletal problems, including postural problems like asymmetry and poor alignment between parts of the body.

In the first study we'll cover today, Zahra Shekari and colleagues from the University of Social Welfare and Rehabilitation Sciences in Iran examined the relationships between postural asymmetry, balance, and pain in a group of 56 children with spastic CP, ranging from eight to 12 years old. In spastic CP, which affects approximately 80% of people with CP, individuals experience tightness, stiffness and/or spasms in their muscles.

This was a cross-sectional study where gross motor function, posture, balance and pain were assessed at one time point. Gross motor function describes how people move and use the muscles in their arms, legs, head, and torso. It includes things like rolling, sitting, and walking.

The participants were categorized based on the extent of their postural asymmetry as having either no asymmetry, mild asymmetry, moderate asymmetry, and severe asymmetry. Greater postural asymmetry was associated with worse balance, worse pain, and lower gross motor function. The researchers did not find a significant relationship between pain and gross motor function.

The results of this study support that the measures examined are related to each other. Postural asymmetry may negatively impact balance and contribute to pain in children with CP. And really looking at these results, thinking about the big picture, clinical care focused on addressing postural problems may help reduce pain and improve balance in people with CP.

A second study, led by Dr Paulo Selber at the Hospital for Special Surgery, along with others at Columbia University, evaluated the alignment of the spine and pelvis in 37 adolescents with CP who were able to walk. Their average age was 13 and a half years old. They measured lumbar lordosis, which is the amount that the lower part of the spine curves inward and pushes the abdomen forward, and they also measured a variable called pelvic incidence, which is important for determining the alignment of the pelvis and the spine.

Pelvic incidence is the sum of two angles, the angle that your pelvis tilts forwards or backwards, and the angle between a horizontal line and the top of your sacral spine, which is the lowest part of your spine.

After measuring lumbar lordosis and pelvic incidence, they calculated the degree of mismatch by subtracting the lumbar lordosis angle from the pelvic incidence angle. And having a large mismatch between the two numbers can indicate poor spine and pelvic alignment, and this can lead to a variety of adverse health outcomes.

Now, the mismatch from people without postural or alignment problems is usually between negative 10 and positive 10 degrees. Pelvic incidence-lumbar lordosis mismatch greater than 10 degrees was found in 67% of the study participants. They also used a model that calculates predicted lumbar lordosis based on pelvic incidence measurements from adolescents without CP to provide values of predicted lumbar lordosis in their cohort of adolescents with CP.

Now the predicted lumbar lordosis for their cohort using this model was eight degrees less, on average, than the actual lordosis angle they measured in the cohort. Taken together, these results highlight that about two-thirds of this sample of adolescents with CP had a high mismatch between lumbar lordosis and pelvic incidence. A greater than predicted angle of lumbar lordosis contributed to this mismatch.

Now this study is important because it set the stage for future research that can help improve our understanding of how this mismatch develops, as well as how poor spine and pelvis alignment may impact health outcomes and quality of life in people with CP.

In today’s final featured study researchers led by Dr Patrick Cahill at the Children's Hospital of Philadelphia, focused on a condition called rib on pelvis deformity. People with CP often have scoliosis, which is a sideways curvature of the spine, and they may also have an upward tilt of their pelvis to one side. The combination of these two conditions can cause a person's ribs to come into contact with the high side of their pelvis. Rib-on-pelvis deformity can result in things like pinched nerves, pain, breathing problems, and poor balance when sitting.

The research team in this study looked back at data from 340 participants with CP who were treated with spinal fusion at least two years ago. The average age of participants was 14 years, and all participants needed assistance to walk. In their analysis, the team controlled for the effects of a variety of different variables that could impact the results, including the magnitude of the pelvic tilt to one side, the severity of scoliosis, the location of the peak of the scoliosis curve, and the type of muscle tone the person had — for example, spastic or non-spastic. Of the 340 participants, 176 or 52% had rib-on- pelvis deformity, while 164 or 48% did not.

Individuals with preoperative rib-on-pelvis deformity had worse pain and worse health-related quality of life than participants who did not have the deformity. However, individuals with preoperative rib-on-pelvis deformity also showed a greater improvement in health related quality of life after their spinal fusion surgery than those without. These results indicate that rib-on-pelvis deformity is a modifiable driver of pain and poor health-related quality of life in cerebral palsy that can potentially be addressed with spinal fusion or other therapeutic approaches to reduce pain and improve quality of life for people with CP.

Now, overall, these studies on postural asymmetry, spine and pelvis alignment, and rib-on-pelvis deformity in people with CP are providing valuable data to inform future treatment approaches and future research in this area. And now I am delighted to welcome Jocelyn Cohen, CPARF’s Vice President of Education, back to the show to talk about the findings of these studies and what they could mean for people with CP and other disabilities.

**Jocelyn Cohen** 07:30

Thanks for having me back, Marie! So, these three studies emphasize the cascading effect that cerebral palsy has on the whole body. For example, in spastic diplegia CP, the brain injury that causes cerebral palsy directly affects someone's legs. But the forces placed on someone's body by the way they move can ripple through their spine and other areas. Because of this, it's crucial for everyone with cerebral palsy to have a care team in place to meet all of their needs. That may include an orthopedist who specializes in cerebral palsy, as well as a spinal specialist to address any emerging issues. Ideally, these two specialists can communicate with each other to coordinate monitoring, treatment, and pain management.

**Dr. Marie McNeely** 08:10

Well, Jocelyn, thanks so much for joining us today and sharing your perspectives.

**Jocelyn Cohen** 08:16

It's a pleasure, as always.

**Dr. Marie McNeely** 08:18

And listeners, thank you for joining us as well. You can find links to the abstracts for the papers we talked about today with the notes for this episode on CPARF’s website. And now I'd like to take a moment to tell you about three for CP, CPARF’s grassroots fundraising initiative for cerebral palsy research and disability innovation. Whether you level up a read-a-thon, a sip-and-paint event, a comedy show, or something else that you love, 3forCP gives you the chance to make a difference in your own signature way. Head to 3forCP.org to get started. That's the number 3, F, O, R, C, P, dot O, R, G. And we look forward to connecting with you again in our next episode of Changing What's Possible.