Case Reports

Chiropractic Management of Pubic Symphysis Shear Dysfunction in a Patient With Overactive Bladder

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Abstract

Objective: The purpose of this case report is to describe chiropractic management of a patient with overactive bladder (OAB) and to describe an hypothetical anatomical basis for a somato-vesical reflex and possible clinical link between pelvic and symphysis pubis dysfunction to OAB.

Clinical features: A 24-year-old nulliparous female with idiopathic OAB, with a primary complaint of nocturia presented for chiropractic care. Her sleep was limited to 2 consecutive hours due to bladder urgency. Pubic symphysis shear dysfunction was observed on physical examination.

Intervention and outcomes: The primary treatment modality used was chiropractic side-posture drop-table manipulation designed to reduce pubic shear dysfunction. After 8 treatments in 1 month, the pubic shear gradually reduced while nocturia diminished and consecutive sleep hours increased from 2 to 7. At 1-year follow-up, the nocturia remained resolved.

Conclusion: The patient reported in this case responded favorably to chiropractic care, which resulted in reduced nocturia and increased sleep continuity.

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Introduction

Approximately 33 million Americans, at least 16.5% of adults, have overactive bladder (OAB),¹ a condition

characterized by urinary frequency, urgency, and/or urge incontinence, in the absence of urinary tract infection or other obvious causes.² The prevalence of nocturia in younger individuals (age 20–40) is 11% to 35% in men and 20.4% to 43.9% in women.³ Current medical treatment for OAB includes pelvic muscle strengthening, behavioral therapies, acupuncture, pharmacologic therapies, surgical procedures), and sacral nerve stimulation.^{4–6} The most promising of

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the surgical approaches for patients who have failed the more conservative therapies is sacral neuromodulation.⁷ The S3 nerve root, pudendal nerve, and/or tibial nerve is stimulated with an implantable device that generates electrical impulses that effectively ameliorates chronic urinary retention, as well as symptoms of overactive bladder. However, a 2012 guidelines document from the American Urological Association concludes, "OAB is a chronic syndrome without an ideal treatment and no treatment will cure the condition in most patients."⁴ Survey data presented by the National Board of Chiropractic Examiners in 2010⁸ indicates that the frequency with which chiropractors manage complaints of "incontinence" (the only listed condition directly related to OAB) is "rare," meaning 1 to 10 cases per year. According to the survey, 62% of the respondents diagnosed subluxation (ie, joint dysfunction) as an etiological factor.

OAB is defined as "urinary urgency, usually accompanied by frequency and nocturia, with or without urgency urinary incontinence, in the absence of urinary tract infection or other obvious pathology."² It is associated with frequent urination, loss of sleep attributable to nocturia, and episodes of unintentional voiding (urge incontinence). Although OAB is distinguished from stress urinary incontinence, these conditions can occur together, leading to the diagnosis of mixed incontinence.⁹ Anatomic weakness leading to OAB may result from nerve or pelvic floor muscle damage during childbirth, chronic coughing or sneezing, high intake of caffeine or alcohol, or high impact activities. When OAB results from detrusor hyperactivity, there may be involuntary detrusor contractions during the filling phase, either idiopathic or due to improper signaling between the bladder and CNS. Loss of detrusor inhibition may occur in Parkinsonism, spinal cord injury, diabetic neuropathy, multiple sclerosis, dementia, or stroke.⁹

In nocturia, sleep is interrupted 1 or more times due to the need to micturate. Pathologic conditions resulting in nocturia include stroke, myeloneuropathy (often secondary to vertebral disk disease or spondylosis), cardiovascular disease, diabetes mellitus and insipidus, peripheral edema, and lower urinary tract obstruction. Anxiety or primary sleep disorders that result in waking may also lead the patient to void, as a matter of habit. Prostatic disease and neurogenic bladder may also lead to waking from sleep and voiding. Taking diuretic medications, consuming beverages including caffeine or alcohol, and excessive fluid intake prior to retiring may also lead to nocturia.¹⁰ The underlying pathophysiologic conditions that account for nocturia

can be described in 4 broad categories: (1) nocturnal polyuria (nocturnal urine overproduction); (2) low nocturnal bladder capacity; (3) mixed (a combination of 1 and 2); and (4) polyuria (abnormally high daily urine output).¹⁰

The term nocturnal polyuria refers to the production of an abnormally large volume of urine during sleep and is the primary cause of nocturia. Urine output normally decreases during the night due to increased secretion of antidiuretic hormone, resulting in decreased resorption of water from the renal tubules and a relatively concentrated urine. In cases of nocturnal polyuria, night time urine output is greater than 20% of the daily total in young adults and 33% in older adults.¹¹ Nocturnal polyuria usually occurs in the elderly^{12,13} but can also appear in younger individuals. According to Weiss,¹⁴ in younger patients with OAB, it is decreased nocturnal bladder capacity rather than nocturnal polyuria that results in nocturia.

At present, there are few case reports describing the relationship between pelvic dysfunction and OAB and no known cases reporting the management of OAB using pubic symphysis manipulation. The purpose of this case report is to describe the chiropractic management of a patient with OAB and to describe the hypothesis and an anatomical basis for a somato-vesical reflex, suggesting a clinical link between pelvic and symphysis pubis dysfunction to OAB.

Case Report

A 24-year-old nulliparous, female full-time chiropractic student and part-time aerobics instructor under medical care for OAB consulted with 1 of the authors, an instructor at the chiropractic college. She complained of difficulty sleeping at night for more than 2 hours at a time, due to inability to sleep longer than 2 hours without voiding her bladder. Her urinary urgency had developed gradually over a 3-year period and was worsening. She described her overall health as "excellent" and was not taking any prescription medications and had no urological complaints (dysuria, hematuria, urethral or vaginal discharges, or hesitancy). The patient denied urinary incontinence (involuntary bladder voiding with laughing, sneezing, or coughing). The patient's chiropractic college clinic had obtained routine radiographs 2 years earlier that had been read as normal. The patient had initially consulted with a medical physician, who obtained laboratory results that ruled out infection or any other medical condition that may have resulted in OAB.

The increased urinary frequency, although persistent during the day and at night, was most bothersome at night since it interfered with sleep. Sleeplessness in turn interfered with studying and other academically-related activities, leading to psychological stress and impaired concentration overall. The patient denied excessive use of caffeine or alcohol, which can produce diuresis. The patient had no mechanical pain complaints although felt generalized muscle soreness that she attributed to lack of sleep. The patient was unable to think of any aggravating or ameliorating factors.

Upon physical examination, the patient had full lumbar range of motion; was able to toe-heel walk without difficulty; and had normal straight leg raising, deep tendon reflexes, cutaneous sensation, and lower extremity muscle strength. Palpation and visualization showed cephalad displacement of the right pubic bone, with no palpable anterior-posterior displacement. Fig 1 illustrates a representation of the suspected pubic symphysis shear dysfunction as judged by the first author. The right side of the symphysis pubis was tender to palpatory pressure. Sitting palpation of the posterior superior iliac spines showed approximately slight vertical displacement (right inferior), suggesting pelvic torsion in a right posterior/left anterior pattern. The step test, in which a thumb placed on the posterior superior iliac spine drops in relation to a thumb placed on the sacral base as the ipsilateral hip is flexed, was positive for fixation of the right sacroiliac joint.

The clinical impression was overactive bladder syndrome secondary to symphysis pubis dysfunction. Lacking contraindications to a mechanical approach, the first author judged a mechanical approach to reducing pubic shear was warranted. Although there

were insufficient data in the published literature to formulate a prognosis, the anatomical relations of the symphysis and bladder suggested there could be a somato-vesical reflex amenable to mechanical amelioration.

The patient temporarily ceased receiving other manipulative procedures in her training program when the first author initiated a mechanical treatment regimen specifically intended to address her OAB. Treatment initially included conventional side-posture sacroiliac manipulation (adjustment) and a less typical manipulative procedure that addressed the pubic symphysis shear dysfunction.

In cases that require visualization and/or contact with areas near a patient's genitalia, it is important to respect potential patient concerns and avoid the appearance of impropriety. To visualize and palpate the pubic bones, it is recommended that the doctor ask the supine patient, fully clothed, to place an index finger on the pubic bone while the doctor indicates the location on an anatomical model of the pelvis. Since the symptomatic symphysis pubis is usually tender or painful to the touch, patients do not have much if any trouble understanding the instruction and placing a finger on the pubic bone. The doctor then obtains permission to replace the patient's finger with his or her own fingers. With an index finger now placed on each of the pubic bones, the doctor verifies tenderness (in the author's experience, invariably unilateral) and loss of symphysis pubis juxtaposition, both visually and via palpation. The first author conducted this examination with the patient fully clothed. In the first author's experience, misalignment can occur in the sagittal plane, with an anterior pubic bone on the side of pain; or in the frontal plane, with a superior pubic bone on the side of pain. In the case of this patient, the patient had been judged to have superior pubic ramus and ipsilateral superior innominate shear.

On the first visit, after receiving a side-posture manipulative procedure intended to reduce sacroiliac fixation, the patient received another manipulation in which she was placed in side-posture on a chiropractic drop-table, right side up (ipsilateral to the side of the cephalad pubic ramus). The doctor of chiropractic, standing behind the patient and facing inferiorly, made a reinforced pisiform contact with the lateral aspect of the iliac crest and delivered a series of 3 high-velocity, low-amplitude thrusts from superior to inferior, with the pelvic section of the table set to drop (see Fig 2). On re-examination, the initial linear offset at the symphysis pubis appeared to be reduced. That night the patient reported she was able to sleep 4 hours without having to wake to void her bladder. Re-examination at the second

Fig 1. Artist rendition of author's theoretical presentation of innominate malposition with pubic shear (adapted from Henry Gray's *Anatomy of the Human Body*, 1918).

visit in week 1 showed she had maintained reduction of pubic shear, despite modest regression of the clinical improvement after the night of visit 1. With 2 more visits in week 2, the trend was toward gradually reducing symphysis pubis misalignment and more hours of consecutive sleep. At the 4th session (end of week 2) the patient was provided an exercise to reduce the risk of her complaints returning: 1-legged stance for about a minute each day on the side of the caudal pubic ramus, which applies a corrective shear force to the pelvis. In week 3 there were 2 more visits, while the symphysis pubis was judged aligned and consecutive sleep increased to 6 hours. In week 4, 1 final treatment session was associated with normal symphysis pubis alignment and 7 hours of uninterrupted sleep. At this point the complaint of nocturia was judged to have resolved. The patient resumed receiving occasional manipulations in the context of her chiropractic training program, but not including the side-posture drop table manipulation.

The patient was contacted approximately 1 year later after completion of care to obtain permission to publish this case report. She reported that she was still consistently getting 7 hours of sleep without having to get up to void. At follow-up she was undergoing monthly 50-minute sessions of muscle work (described as Swedish and/or deep tissue), involving over all major muscle groups, and was working on strengthening her lower abdominal muscles through weekly pelvic tilts and tucks. At the 1 year follow-up, the patient completed an Overactive Bladder Questionnaire¹⁵ which has subsections for daytime frequency, sudden urge, uncomfortable urge, volume, strength of desire to void, urine loss with stressors, waking up with urge, and nocturia. Her score prior to care (based on recall) was 9/20; the post-

treatment score improved to 2/20. The patient provided consent to have her personal health information published and no adverse events were reported for this study.

Discussion

In this case, with medical reasons for nocturia and polyuria having been ruled out, and furthermore with a patient whose age argued against nocturnal polyuria, the authors suspected a urine storage disorder was the cause of her nocturia. This can result from reduced functional bladder capacity (post-void residual), reduced nocturnal capacity, detrusor hyperactivity (neurogenic, as in multiple sclerosis; or non-neurogenic), bladder hypersensitivity, bladder outlet obstruction with post-void residual urine, and urogenital ageing.¹⁶ The core symptom in the OAB syndrome is urgency,¹⁷ although nocturia is often an important accompanying issue, as in this case where it was the patient's primary complaint.

Three threads of basic science and clinical research suggest possible mechanisms for a somato-vesical reflex associated with OAB. There are a few prospective studies and numerous case reports of patients who experienced improvement in various urinary dysfunctions after manual therapy.

Basic Science Evidence for a Connection Between Lumbopelvic Somatic Pain Stimuli and Urinary Bladder Function

Although animal studies are not always directly relevant to human populations, Sato¹⁸ demonstrated in anesthetized rats that noxious stimulation of the perineal skin produced increased intravesical pressure, whereby reflex pathways in the pelvic nerve and sacral spinal cord create a cutaneo-vesical response. Boggs¹⁹ found that activation of urethral or genital afferents of the pudendal nerve affects the micturition reflex, either inhibiting or stimulating it. Maggi²⁰ also demonstrated the existence of a somato-vesical excitatory reflex organized at the spinal level in anesthetized rats. DeGroat²¹ described a spinal micturition reflex in neonates that is activated by somatic afferent fibers from the perigenital region. Sasaki²² found a similar somato-vesical excitatory reflex in anesthetized cats; while Budgell²³ demonstrated that noxious stimulation of the thoracic and lumbar interspinous tissues in anesthetized rats produced a substantial and long-lasting increase in bladder pressure. Hotta²⁴ found that gentle stimulation of the perineal area in anesthetized male rats inhibited

Fig 2. Side-posture drop table manipulation for pubic shear.

both micturition contractions during and after stimulation. Bladder contractions evoked by pudendal nerve stimulation in both spinal-intact and spinal-transected cats support the possibility of restoring urinary function in persons with chronic spinal cord injury (SCI).

Clinical Evidence for a Spinal Origin of Urinary Bladder Dysfunction

Emmett and Love^{25–27} presented cases of “asymptomatic” protruded lumbar discs in patients with various types of vesical dysfunction, suggesting an intimate relation of spinopelvic structure and bladder function. Eisenstein²⁸ reported an association between low back pain and urinary urgency incontinence in 16 patients, hypothesizing pain inputs through the sacral plexus (S2–4) may result in either detrusor contraction or bladder neck relaxation and that the pudendal nerve (S2–4) may be involved in stress incontinence. Perner²⁹ described lower urinary tract symptoms in a prospective observational study of 108 male patients admitted for surgery for lumbar disc herniation or spinal stenosis. The distal pudendal nerve is susceptible to compression at the passage from Alcock’s canal, often resulting in urinary incontinence and other symptoms^{30,31}; surgical treatment for pudendal nerve compression has been described.³¹ There have been some case reports of symphysis pubis diastasis which resulted in urinary symptoms including urinary incontinence.^{32,33}

Clinical Evidence Suggesting Manual Therapy Alleviates Lower Urinary Tract Dysfunction

Dangaria³⁴ reports a case of a 27-year-old female with urinary frequency and urgency that resolved with sacroiliac manipulation, perhaps due to shared innervation. Franke³⁵ performed a meta-analysis of osteopathic manipulative treatment (OMT) for lower urinary tract problems in women, reporting favorable results. The review included 2 OAB dissertation projects.^{36,37} Browning presented a number of cases^{38–42} demonstrating improvement in urogenital symptoms following chiropractic distractive decompression manipulation. Stude⁴³ reported a case of a 12-year-old girl with urinary incontinence and low back pain whose symptoms improved during a 4-month course of spinal and intrarectal sacro-coccygeal manipulation. Falk⁴⁴ presented 2 cases of dysuria in male patients secondary to acute low back pain, resolving following side-posture manipulation. Vallone⁴⁵ presented a case report of a 7-year-old girl with recurrent urinary tract infections for over 2 years, which resolved following spinal manipulation. Cashley⁴⁶ successfully treated 8 cases of

bladder pain (3 of which included OAB-like symptoms) with chiropractic methods, none of which involved direct adjusting of the symphysis. Hampton⁴⁷ reported a case in which OAB and bedwetting in a 9-year-old male resolved during care with Sacro-Occipital Technique, a proprietary chiropractic technique.⁴⁸ Kamrath⁴⁹ described resolution of urinary and bowel incontinence in a 5 year old male using instrument adjusting methods. Fedorchuk⁵⁰ reported improvement in a case involving a soldier with urinary urgency. Zhang⁵¹ reported the improvements in 13 patients with urinary incontinence treated with a percussive device called the Pro-Adjuster. In a non-randomized controlled clinical trial, Hains⁹ reported ischemic compression of trigger points over the bladder area to be effective in reducing the symptoms of stress incontinence. Cuthbert and Rosner wrote both a case report⁵² and a case series including 21 patients,⁵³ in which all the patients had had stress incontinence that improved when treated with Applied Kinesiology,⁵⁴ a proprietary chiropractic technique system. Stone⁵⁵ proposed a pathway whereby an original insult such as infection or trauma could lead to OAB either directly due to anatomic weakness, or indirectly via altered bladder afferents to the spinal cord.

The improvement that occurred associated with manipulation of the symphysis pubis in the case at hand suggested a possible somato-vesical reflex, whereby a mechanical fault could impact upon the neuroanatomy of bladder function. Without evidence of anatomic weakness leading to OAB, nor any known medical condition leading to detrusor hyperactivity, we considered the primary complaint of nocturia likely related to pubic shear and attendant abnormal neurological control of the micturition reflex. The pelvic bowl consists of 3 bones (sacrum and 2 innominate bones) and 3 joints (symphysis pubis and 2 sacroiliac joints). The anatomy suggests that if the symphysis pubis is misaligned, then there will be commensurate shearing involving 1 or both of the innominate bones. This has been described in osteopathy as innominate upslip or downslip, or simply shearing.⁵⁶ Although osteopaths believe this pelvic malposition is common in chronic low back pain, 1 of a “dirty half-dozen” findings,⁵⁷ the authors are not aware of confirmatory studies. Pubic symphysis shear dysfunction can occur as a complication of child-birthing or other trauma, including landing hard on 1 leg.⁵⁸ In this case, the patient’s part-time position as an aerobics instructor was considered a risk factor for pubic shear.

Descriptions of pelvic anatomy rarely mention pubic vertical displacement, even while discussing frontal plane gapping as wide as 3 cm.⁵⁹ Highly stressed anatomic positions cause only about 1 mm of displacement as

seen in radiography.⁶⁰ Ruch has written that standard lumbopelvic radiography may commonly result in false negatives in looking for pubic shear.⁶¹ In innominate shear, conceptually 1 innominate would be regarded as having undergone upslip while the other has undergone downslip. Osteopathic textbooks refer to this lesion as an upslip or downslip depending on which sacroiliac joint is more painful and/or fixated.⁶² In this case, the assumption, given the finding of fixation in the right sacroiliac joint, was to regard the patient as having undergone innominate upslip on the right associated with superior pubic shear. Travell reported that upslip of the innominate bone may be seen in cases of tenderness of the symphysis pubis.⁶³

After arising from the sacral plexus, the pudendal nerve enters the pelvic cavity through the lesser sciatic foramen. It travels between the levator ani and obturator internus muscles before giving off branches and traversing the superior urogenital fascia to penetrate the urogenital diaphragm. The terminal branch of the pudendal nerve includes the dorsal nerve of the penis and clitoris.⁶⁴ The pudendal and genitofemoral nerves, as well as branches of the iliohypogastric and ilioinguinal nerves, innervate the symphysis pubis.⁵⁹ The pelvic, hypogastric and pudendal nerves also carry sensory information in afferent fibers from the lower urinary tract to the lumbosacral spinal cord.⁶⁵ Pelvic nerve afferents monitor bladder urinary volume and bladder contraction during voiding, thus initiating and reinforcing micturition. The activity of efferent pelvic bladder nerves increases with filling, modulated at the level of the CNS.⁶⁶ The shared innervation of the bladder and symphysis pubis underscores a hypothetical somato-vesical reflex whereby mechanical dysfunction of the symphysis pubis could lead to OAB, whether due to improper signaling of bladder filling, a lowered threshold for the micturition reflex, or impaired bladder emptying (which sets the stage for increased urinary frequency).⁶⁷ There are descriptions of how, depending on the stimulation frequency, electrical stimulation of pudendal afferents either inhibits the bladder, promoting continence, or excites the bladder resulting in micturition, in both cats and persons with spinal cord injury.^{68,69} Although this could conceptually be consistent with either suppression of sympathetic efferent activity (inhibiting the inhibitor) or excitation of parasympathetic afferents (exciting the exciters), research showed the latter mechanism was in play.⁶⁷ Given the anatomical relations of the symphysis pubis, the bladder, and the terminal branches of the bladder nerve, the anatomical groundwork is laid for a hypothetical somato-vesical reflex.

Similar procedures have been described that are similar to the side-posture drop table manipulation procedure used in this case. A Chiropractic Biophysics Technique textbook illustrates side-posture drop table positions; however, this was not reported for treating innominate or pubic shear.⁷⁰ Chiropractic techniques such as Thompson Technique⁷¹ and Pierce-Stillwagon Technique⁷² use drop-tables but do not describe a side-posture method, nor procedures for pubic shear. An article in a massage journal depicts a side-posture stretch of suprapelvic musculature on the side of an upslip, but does not describe a manipulative thrust nor use of a drop table.⁷³ Osteopathic muscle energy techniques are performed in which the patient is asked to resist thus performing an isometric muscle contraction while the therapist applies a counterforce in a specific direction.⁷⁴ This is thought to normalize muscles and joint function. In this method,⁷⁴ the supine patient with knees and hips flexed to 45° resists while the therapist's crossed arms attempt to abduct the legs by applying medial to lateral pressure at the knees. This frequently results in an audible click of the pubic joint. A similar procedure is described in a chiropractic journal.⁷⁵

The exercise prescribed in this case, 1-legged stance on the side of the caudal pubic ramus, was developed based on the analysis of 1-legged stance. This is described as the Chamberlain position,⁶⁰ in a text by Kapandji.⁵⁸ He wrote: "When one stands on one foot... this leads to a *shearing force* at the level of the symphysis pubis which tends to raise the hip on the supporting side."

Manual therapists have described treatment success for OAB and other urinary complaints using a variety of mechanical and soft-tissue interventions in the pelvis and lumbar spine. Many treatment approaches either directly or indirectly attempt to improve the function of the pelvic floor musculature, composed of the puborectalis, levator ani (pubococcygeus and iliococcygeus), and coccygeus muscles.

Limitations and Future Studies

This case report cannot prove a causal relationship between the chiropractic procedure and symptom resolution. Beyond the limitations inherent in retrospective reporting, we must consider the specific circumstance that the patient was treated with conventional side-posture sacroiliac interventions in addition to the less conventional side-posture drop table manipulation. It cannot be absolutely determined what individual contribution was made by the various elements of the overall treatment approach. And, as this is a case report, the information cannot be extrapolated to other patients.

Since the patient in this study received a variety of interventions and not only the side-posture drop table manipulation intended to reduce pubic and innominate shear, no causal relation can be inferred between the shear manipulation alone and the good clinical outcome. However, the spinal and sacroiliac manipulations the patient had been receiving from other students as part of the training program at the chiropractic college had not ameliorated the OAB syndrome, whereas the manipulative procedure we introduced was temporally related to symptom resolution.

Both pre and post Overactive Bladder Questionnaires¹⁵ were administered retrospectively, at the time we contacted the patient for long-term follow-up. The patient's entries must be considered subject to recall bias. The survey that was used is not among the most well-known that have been described,¹⁷ and its reliability and validity are unknown. We did not review previous plain film radiographs or obtain new ones prior to care. The pivotal physical examination finding in this study was pubic shear, a component of a more encompassing pelvic shear. Although the chiropractic college clinic treating the patient for minor musculoskeletal complaints had obtained routine radiographs, the authors did not attempt to review these studies. Had these films shown shear, our treatment protocol would not have changed; likewise there would have been no changes if they had *not* shown pubic shear, since standard lumbopelvic radiography may commonly result in false negatives in looking for pubic shear.⁶¹ The first author, having had previous success with other patients with similar findings, in the absence of red flags precluding treatment without radiography, saw no reason to delay care by requisitioning 2-year-old radiographs. No effort was made to objectively measure the amount of pubic shear at any time during the course of treatment. This would have increased the invasiveness of palpating the pubic bones, and moreover would have been unnecessary for the case at hand. Had this been a prospectively designed study, it may have been appropriate to objectively quantify the amount of pubic symphysis shear dysfunction.

Future prospective studies are required to determine the extent to which various manual therapy approaches to OAB may complement or in some cases substitute for conventional approaches.

Conclusion

This case report described resolution of OAB associated with a side-posture drop table manipulation,

intended to address pubic symphysis shear dysfunction. The theories presented suggest a possible somato-vesical response to various types of manual therapy for OAB.

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No funding sources or conflicts of interest were reported for this study.

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