Chiropractic Management of Nocturnal Enuresis

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ABSTRACT

Objective: This literature review provides an overview of literature that researches the benefits of conventional treatments along with the effectiveness of chiropractic adjustments on nocturnal enuresis. Emphasis is given to the structural relationship of the spine, especially the lower lumbar and sacral spine of children with enuresis. Chiropractic is known to treat musculoskeletal defects and through static and motion palpation a misalignment can be found and then treated. Manipulating the spine back into proper position can potentially help the child with bed-wetting by providing a better functioning spine. The bulk of the research done on nocturnal enuresis has been done by the medical field and shown nocturnal enuresis to respond well to medical and surgical treatments. Most of the studies reviewed in this particular literature review have not shown chiropractic care to be the cure for nocturnal enuresis; however, research has shown that chiropractic care along with other treatments including nutritional and psychiatric treatment help manage the bed wetting allowing for a better daily life.

Data Collection: A computer search using PubMed, EBSCOHost, Index to Chiropractic Literature (ICL), MANTIS, and Chiroweb generated articles relevant to nocturnal enuresis, lumbar and sacral spine adjusting, and other treatment methods including psychosocial treatment and nutritional advice. Referenced sources were identified from the individual searches and from accumulated review of chiropractic literature. PubMed and MANTIS searches generated over 1,000 articles on nocturnal enuresis and generated over 400 articles on the anatomy and physiology of the bladder. Chiroweb, ICL, and EBSOHost searches all together generated over 90 articles on the chiropractic treatment of nocturnal enuresis. Less than 60 of the articles discussed all three topics of nocturnal enuresis, chiropractic adjusting, and other treatment methods for managing or alleviating nocturnal enuresis.

Data Synthesis: Persistent nocturnal enuresis of a child after reaching bladder and phrenic reflex maturity is potentially related to spinal instability. The out-of-place vertebra can directly or indirectly keep the spine from correctly reacting to the normal sleeping processes.

Conclusion: Data collection of over one thousand articles consisting of selective reviews and controlled studies, in addition to several noteworthy texts, supports the concept that chiropractic adjusting of the lumbar and sacral regions may not cure nocturnal enuresis, but in combination with other treatments including nutritional and psychiatric along with additional medical treatment will help manage the bed wetting. Emerging evidence suggests that psychological factors such as anxiety, depression, fear avoidance, self-efficacy, coping style, and catastrophic events are important aspects which should be considered in the treatment of bed wetting. Treatment options are aimed at combining multiple types of adjusting along with tackling the potential psychological and nutritional aspects of the condition. Chiropractic care combined with other treatment strategies can help manage nocturnal enuresis, however sometimes medical as well as even surgical treatment is necessary.

Key Indexing Terms: Nocturnal enuresis, bed wetting, chiropractic treatment, lumbar adjustments, sacral adjustments, bladder anatomy, bladder physiology, prevention, contraindications

INTRODUCTION

Bed wetting or nocturnal enuresis is one of many reasons parents may bring their children to see a chiropractor. Many children wet the bed during the first years of life, but by the time the child is four or five the child is expected to have proper bladder control [1, 2]. Bed wetting is a common problem for millions of children as well as adults world wide. Clinically known as "nocturnal enuresis," bed wetting can be as embarrassing as it is annoying. This problem is not only bothersome for the child experiencing the problem but also other family members involved. Enuresis refers to the inability of a child to establish proper bladder control resulting in either daytime or nighttime involuntary urination [1]. In most cases of enuresis the parents believe the child will simply grow out of it, so no further treatment is sought out [1, 2, 3]. The traditional chiropractic approach when treating a child with enuresis is to adjust the spine generally in the lumbar and sacral regions where misalignments are found. Since the nerve supply to the muscles which control urinary emptying are connected to the brain through the spinal cord, it is believed that aligning the spine will correct any slow messaging or incomplete signals between the brain and the bladder. To understand the problem a child is facing the physician must first understand the mechanism. Chiropractors as well as other medically trained physicians are proficient when it comes to the anatomy and physiology of the body. The mechanism behind bed wetting starts when the breathing slows down during sleep which then raises the body's carbon dioxide levels causing a spinal reflex known as the phrenic reflex. This reflex is normally followed by a deep inhalation, a contraction of the smooth muscles, and then normal breathing. However, if

the reflex is not functioning properly it will cause the smooth muscles to relax which will then open the valve at the end of the bladder releasing any fluid [2, 3, 4]. In some cases the bladder has still yet to mature, but in nocturnal enuresis cases the bladder has fully matured and there is another underlying cause [2]. Chiropractors are able to provide relief when there is a musculoskeletal obstruction known as a subluxation [3]. This obstruction or out-of-place vertebra can cause the spine to function improperly, therefore disrupting normal sleep [3, 4]. Chiropractic uses static or motion palpation to find this obstruction and by adjusting the vertebra, proper function can potentially be restored [3, 5]. Most of the studies reviewed have not shown chiropractic care to be the cure for nocturnal enuresis; research has shown, however, that chiropractic care helps manage the bed wetting allowing for a better daily life. This review examines relevant and recent historical research regarding chiropractic management of nocturnal enuresis. The review will research this approach of treatment to determine the validity behind it, not only by looking at chiropractic alone but also combining it with other treatments including psychological and nutritional therapy.

DISCUSSION

Nocturnal enuresis is a condition in which a person who has bladder control while awake and urinates while he or she is asleep. The condition is commonly called bedwetting and it often has a psychological impact on not only children but their families as well [3, 4, 5]. Children with the condition often have low self-esteems and their interpersonal relationships, quality of life, and school performances are affected [5, 6]. Children achieve bladder control (continence) at different ages and usually achieve daytime continence before nighttime dryness [4]. Most children are continent by the age of

4 or 5 but statistics within the last six years have shown that the ages have risen to 5 or even 6. Nocturnal enuresis is common and usually does not require treatment in children of preschool age who achieved continence during the day [6, 7]. Nocturnal enuresis is classified as primary (PNE) or secondary (SNE) [8]. In primary nocturnal enuresis, the child has never been consistently dry at night. If the child has experienced at least 6 months of dryness at night and then begins bedwetting, the condition is referred to as secondary nocturnal enuresis. Psychological issues and acquired medical conditions cause the development of SNE. Nocturnal enuresis has been shown to be more common in males and prevalence of the condition gradually declines during childhood [7, 8]. Approximately 20% of 5-year olds, 20% of 7-year olds, 5% of 10-year olds, and 1–2% of those aged 18 and older experience bedwetting [7]. Secondary nocturnal enuresis accounts for approximately 25% of cases [8]. The prevalence of secondary nocturnal enuresis shows that there is usually more than one issue involved with the child or adult affected [7].

There are a number of causes for nocturnal enuresis. Primary nocturnal enuresis is often caused by a chromosomal abnormality and there is a strong genetic link associated with the condition [7, 8, 9]. Children whose parents or siblings experienced bedwetting are at increased risk. If one parent had the condition, the risk is approximately 45% and if both parents had the condition, the risk is approximately 75% [7, 10]. The causes of PNE include an abnormally positioned ureter, which is also known as an ectopic ureter and is more common in females [4]. Other causes include polyuria, which may result from excessive fluid intake, any heart condition causing an irregular heartbeat, constipation, and a sleep arousal disorder. Neurological disorders are also common causes such as cerebral palsy, spinal cord disorders, and a neurogenic bladder. Urinary tract infection

and Urethral obstruction, congenital or acquired as a result of trauma or infection, are also very common causes of PNE [8, 9].

Compared to primary, secondary nocturnal enuresis may be caused by psychological issues such as death in the family, sexual abuse, extreme bullying, and is often associated with stress. It may also result from an acquired condition such as diabetes, overproduction of hormone by the thyroid gland known as hyperthyroidism, seizure disorders, and obstructive sleep apnea [4, 10]. When it comes to the diagnosis of both subcategories of nocturnal enuresis a great deal of history is involved [10].

Diagnosis of nocturnal enuresis is made when involuntary urination regularly occurs during sleep in a person who is continent while awake. Determining the cause of the condition requires a detailed medical history and a comprehensive physical examination [11, 12]. The detailed medical history would first include an assessment of psychological and emotional stress [12, 13]. It is also important to keep track of the child's fluid and dietary intake, especially late in the day. Daytime voiding frequency and volume must also be taken into consideration [13, 14]. Other history includes the child's sleep histories, which means the times the child goes to bed, falls asleep, and awakens; then notice the depth of sleep, timing of bedwetting, if there is any snoring or nightmares. The last detail to observe is the periods of nighttime dryness and the circumstances [14, 16]. The comprehensive physical examination consists of taking the child's blood pressure, examination of the genitalia, palpation of the kidneys, bladder, and lower spine. A neurological examination of the lower body including gait, muscle strength and tone, reflexes, and sensation should follow [4, 15].

Treatments for nocturnal enuresis, including the field of chiropractic, are to reduce the social and psychological impact of the condition and to eliminate the underlying cause. Treatments include behavioral modification, which includes positive reinforcement, periodic waking, restricted fluid intake, alarm therapy, specific medications, and surgery in cases of obstructive sleep apnea, ectopic ureter, and heart block [17, 18]. Chiropractic treatment attempts to go one step further in using spinal adjustments to help in the process. Treatment of the lumbar and sacral spines specifically the lower lumbar spine from L3 to L5 allow for proper function of not only the spine but also the bladder [19]. Chiropractic treatment assesses the physical and mechanical problems and takes into consideration the nerve supply to the bladder and its association with the spine [2, 19]. It is important to manage nocturnal enuresis in a way that will reduce not only the child's embarrassment but the anxiety within the family [16, 17]. Family members who have outgrown the condition can share their particular experience with the child to reduce feelings of isolation. Parents should use patience and caring while waiting for the child to outgrow bedwetting. Behavior modifications often improve nighttime dryness within one month [17, 19].

Positive reinforcement is very important just for development in a young child and a child with nocturnal enuresis it is imperative. It can be as simple as telling the child good job or something a little more in depth such as keeping a chart with gold stars awarded for dry nights [20]. This reinforcement as well as periodically waking the child at night to use the bathroom can both be very beneficial [21]. An alarm clock set to go off a few hours after the child goes to bed can be used to wake the child or the parent [20, 21]. Restricting the intake of fluids in the day and encouraging voiding at regular intervals

throughout the day may also be helpful. The child should be encouraged to use the bathroom every one to two hours during the day and immediately before bed.

Alarm therapy has a success rate of approximately 70%, works best in older children who are well motivated, and requires commitment from all household members who may be awakened by the alarm [24]. It takes sometimes several months to produce improvement, and if the child is not dry after 3 consecutive months of use, therapy should be discontinued until the child is older. The alarm is positioned to sense wetness promptly and although most children sleep through the alarm, they stop voiding when it sounds [24, 25]. A parent then helps the child to the bathroom to finish voiding; changes wet sheets and pajamas; resets the alarm; and takes the child back to bed. Some children who achieve success with this type of therapy are able to sleep through the night without voiding, but others may continue to get up during the night to use the bathroom [25].

Another form of treatment that has shown success is use of medications. Drug therapy is usually reserved for children who have had no success with non-pharmacological treatments [22]. Medications used to treat nocturnal enuresis include desmopressin acetate, oxybutynin chloride, hyoscyamine sulphate, and imipramine [22, 23]. Desmopressin is an antidiuretic that is used to treat primary nocturnal enuresis. It is available in a nasal spray or oral form and is up to 55% effective [23]. It may also be combined with alarm therapy [20, 23]. Side effects of the nasal spray include nasal discomfort, nosebleed, abdominal pain, and headache. It is important to reduce fluid intake when taking Desmopressin. If fluids are not restricted, water intoxication may occur. This condition requires immediate medical attention. Symptoms of water intoxication include headache, nausea, vomiting, and seizure [23]. Ditropan (oxybutynin)

and Levsin (hyoscyamine) are anticholinergic medications that reduce muscle contractions in the bladder. The usual dose is 2.5–5 mg taken at bedtime. Side effects include blurred vision, constipation, dizziness, dry mouth, facial flushing, and fluctuations in mood [22, 23]. Tofranil (imipramine) may be prescribed in doses of 25 mg in children 6 to 8 years old and 50–75 mg in older children, taken 1 to 2 hours before bed. This antidepressant effectively treats primary nocturnal enuresis without organic causes in as many as 40% of cases when used as a temporary adjuvant therapy [23, 25]. Side effects include constipation, difficulty voiding, drowsiness, nervousness, mood changes, and sleep disorders [26]. Overdose can be fatal and the World Health Organization does not recommend using this drug for nocturnal enuresis [22].

Another form of treatment used only for structural abnormalities and when it is completely necessary is surgery. Surgery, according to both the medical profession as well as chiropractic is always the last resort in treating nocturnal enuresis. Structural abnormalities in the urinary system and other conditions, such as obstructive sleep apnea and heart block, may require a certain type of surgery [12]. Another surgery provided when a patient has had no success in management is on the detrusor muscle. The detrusor is the muscle that contracts while urinating to squeeze out the urine and relaxes to allow the bladder to fill. The involvement of surgery when attempting to treat severe detrusor overactivity is limited and should only be considered when all other less invasive treatment options have proven to be unsuccessful [12, 13]. There is also a myectomy that can be done on the detrusor muscle. This process is also known as autoaugmentation that involves removing a portion or all of the exterior muscle surrounding the bladder. It intends to strengthen the contractions of the bladder while also reducing the number of

contractions [13]. Surgery has known to rid the problem of nocturnal enuresis but rarely takes care of the underlying cause [25].

Chiropractic treatment has been shown to be a very affective way of treating and managing nocturnal enuresis. It deals with treating and correcting conditions known as subluxations or misalignments in the spine to improve mobility and overall function throughout the body [26]. There are many chiropractic techniques designed to address the immobile or misaligned segment. The techniques that have shown the greatest amount of success include Gonstead technique, Diversified technique, Sacral Occipital Technique, and Active Release Technique. Chiropractic has been shown to be great in combination with other therapies; however has been shown to not be as effective in treating children as well as adults with nocturnal enuresis [26, 27, 29]. When applying chiropractic to patient's with nocturnal enuresis many segments of the spine are taken into consideration. Many chiropractors have shown through case studies that treating not only the lower lumbar spine and sacral spines, but also the lower thoracic and upper cervical spines are very beneficial in management of nocturnal enuresis [27].

Studies and research has shown that the main segment of the spine to be looked at when dealing with bladder problems is the lower lumbar and the sacral spines. After assessing the spine through different methods of motion and static palpation many chiropractors have stated that the subluxations tend to fall in the segments of S1 to S2 and in the lower lumbar spine [29]. These same physicians also state that they are finding multiple subluxations in the mid-thoracic to upper thoracic spine usually around T11 to T12 [29, 30]. This is generally due to neurological control of the bladder functions lie with the hypogastric plexus which is under sympathetic nervous system control and lies at the

T11 to T12 levels as well as the pudendal nerve which lies in the S2 to S4 levels of the spinal column and is under parsympathetic nervous system control [4, 18]. Adjusting these particular segments allows a "release" from each nervous system allowing for better function of each specific nerve or plexus. Research today focuses on the combination of chiropractic as well as psychosocial and nutritional therapies and shows it to be very beneficial [26]. Studies show that chiropractic has been known to help with the musculoskeletal lesions that accompany those with enuresis while the psychosocial and nutritional therapies go one step further in addressing other problems whether it is the child's home-life or their diet and intake of fluids [24, 30].

Case Studies:

It is obvious with the many suggested etiologies of enuresis that not one regimen will be appropriate for all cases. In many of the cases the etiology is clearly linked to musculoskeletal trauma or dysfunction. These cases presented such individuals, whose conditions responded well to chiropractic adjustments, suggesting an underlying cause of musculoskeletal dysfunction. Many of the cases presented contain many different treatments alongside chiropractic care including, nutritional supplementation such as vitamins and minerals, psychosocial treatments including seeing a psychologist, medication, and physical therapy modalities [26 - 34].

The first study reviewed was done by Alcantara and Weisberg on a nine year old boy with nocturnal enuresis after ineffective attempts by the medical profession. After a full history and inspection of the patient, subluxations where found in the patients cervical, lumbar, and sacral spines regions. The patient was treated with diversified technique which delivers a contact specific, high velocity, low-amplitude type thrust to

sites of spinal subluxations. As noted before chiropractic care was in combination with nutritional therapy including dietary modifications. A 7-day dietary intake form was implemented. The patient was treated 4 days the first week and 3 days the second week and reported to be free of enuresis following the second week. The boy returned for a four month follow up and showed to be enuresis free; which deemed resolution of his nocturnal enuresis. Dramatic improvement was noted by the boy's parents following the first three treatments by stating he had his first dry nights following [26]. This study demonstrated how many times nocturnal enuresis is just a secondary outcome of any already underlying cause.

Two more studies were done showing the different techniques of chiropractic can still have the same outcomes with nocturnal enuresis patients. A study from Rodnick and Rodnick showed resolution of nocturnal enuresis in an 11 year old boy with a history of nocturnal enuresis and attention problems also known as Attention Deficit Disorder (ADD). During the evaluation the boy was found to have segmental dysfunction or subluxations from his cervical spine to his sacral spine. Gonstead technique, which is a very specific high velocity and low amplitude technique, was used along with Activator adjustments. These techniques were applied to subluxations at C2, C6, T1, T5, T12, L3, L5 and pelvic segments. The patient and mother reported a significant decrease in episodes of bedwetting and an improvement in his attention problems following the first week of treatment. There was significant decrease in episodes of bedwetting and a marked increase in attentiveness [27]. The boy also sought out care from a psychologist which helped manage the attention problems and a multivitamin was given to the boy to be taken two times a day. The next study from Haavik, Holt, and Postles described a four

year old not only with nocturnal enuresis, but also with asthma and the effect chiropractic care had on him. This four year old boy had a history of allergies, bedwetting, and disrupted sleep and had sought after many different types of treatment with no success. The child received spinal and cranial adjustments based on Sacro-Occipital Technique (SOT) protocol. The Sacro-Occipital Technique entails an elaborate method of analyzing the body's structures in the vertical, prone, and supine positions. By following this system, one can supposedly determine the existence of bony distortions and displacements, and, by so doing, make an analysis for "restoring proper nerve force through a balancing of the respiratory and cerebrospinal fluid systems and pressures," which, in turn, "removes nerve pressure from within by restoring the vital fluid that produces nerve function and this fluid is none other than the cerebrospinal fluid [28]." Following 32 weeks of care the boy no longer suffered from asthma and his bedwetting had ceased. The boy was also given nutritional advice as well his dietary intake of food and liquids monitored. Thus far clinical trials have failed to provide sufficient evidence to support the potential link between improvements in childhood problems such as asthma and nocturnal enuresis and chiropractic care; however more research is still being done to bridge the gap [28]. Both studies describe how chiropractic care has benefited these patients and families by using completely different techniques. One technique issues a high velocity "thrust" while the other is a low-force technique. These studies demonstrate that no matter the technique applied, as long as the underlying cause is taken care of and the patient is treated at the correct segments, the symptoms are relieved.

Another study done by Van Poecke and Cunliffe was on the effect of a specific type of chiropractic treatment on patients between the ages of 3 and 18 with primary

nocturnal enuresis. A total of 33 patients were studied over a three year period of time using a chiropractic treatment known as NeuropImpuls Protocol. This protocol uses the foundational principles of the Gonstead system of subluxation analysis combined with orthodox techniques of neurological assessment together with toggle recoil and Logan Basic systems of adjusting. All patients were analyzed for a baseline wet-night frequency at 3, 6, 9, and 12 months after the beginning of treatment. Data was collected from the patients' visits over the next 12 months and continence and the amount of nights continent were taken into consideration. The data was analyzed using descriptive statistics, Friedman's test, and Dunn's Multiple Comparison test. Of the 33 patient records analyzed, 22 showed complete resolution of primary nocturnal enuresis after the 12 months. The mean number of treatments in the responders group was 2.05 +/- 1.33. Ten responders presented with constipation and a further 8 with a positive family history of PNE. A full resolution of constipation was shown to be essential to the successful response to treatment. A combination of constipation and positive family history at presentation represented a poor prognostic factor. There was a 66.6% resolution rate within 1 year in 33 consecutive children and teenagers who experienced PNE [7]. This study demonstrated a great success rate however fell short in its description of how each child was treated individually. Other studies show that each prognosis is different and no one case treats the same as another; therefore, to solidify evidence that chiropractic helps manage or even resolves nocturnal enuresis require a further more detailed study.

A study by Reed, Beavers, Reddy, and Kern used a controlled clinical trial for ten weeks preceded and followed by a two week non-treatment period of children with nocturnal enuresis. A total of 57 children ages ranging from 6 to 16 years were initially

included in the study however, only 46 children were able to participate. Fifteen children were selected at the beginning of the treatment for the control group while the other 31 were in the treatment group. All 46 children were treated with the Gonstead technique which is a high velocity, low amplitude technique, along with the Palmer Package Techniques or a sham adjustment using the Activator tool at a nontension setting administered to the examiners underlying contact point or finger. The Gonstead techniques were given to the treatment group while the sham activator adjustments were given to the control group. Two 5th-year chiropractic students under the supervision of two clinic faculty performed the adjustments. The post-treatment mean wet night frequency of 7.6 nights/2 wk for the treatment group was significantly less than its baseline mean wet night frequency of 9.1 nights/2 wk ($p = 0.05$). For the control group, there was practically no change (12.1 to 12.2 nights/2 wk) in the mean wet night frequency from the baseline to the post-treatment. The mean pre- to post-treatment change in the wet night frequency for the treatment group compared with the control group did not reach statistical significance ($p = 0.067$). The data showed that 25% percent of the treatment-group children had 50% or more reduction in the wet night frequency from baseline to post-treatment while none among the control group had such reduction. All the numbers suggest that there is a chiropractic breakthrough; however, research is inconclusive due to the short time span of the research. The results show a great benefit of chiropractic care on primary nocturnal enuresis, but like the last study it failed to show complete detailed treatment of each individual child. It stated in the study that some children reacted quicker to treatment if they also were seeking outside treatment such as physical therapy and psychological treatment; however that was not

taken into consideration when the results were finalized. A larger study of longer duration would be beneficial in providing further evidence that chiropractic care combined with other therapies allow for management of nocturnal enuresis [1].

Hough is a chiropractor who produced a study that claims only two to three visits are required to solve bedwetting problems in children with nocturnal enuresis. He presented two case studies that are the "extremes" in number of adjustments [29]. The first study was Esta, a 4-year-old female, who wet the bed nearly every night. Subluxations were found at her sacrum, ileum, T3, T5 and in her cervical spine. She was adjusted using the diversified technique on two separate occasions the first day she came in. The next day her mother reported she was dry. She was seen two other times that same week and adjusted twice each day. After one month it was reported that she had no more problems with. In the second study Aaron, a 5 year old male had pain in his feet in addition to nightly bedwetting. Subluxations were found in his sacrum, ileum, thoracic and cervical spine. In addition restrictions were found in the calcaneus vulgus of both feet. Adjustments were performed again using the diversified technique but with this patient, but with Aaron another soft tissue technique was used called Active Release Technique. Active Release Technique (ART) is most commonly used to treat conditions related to adhesions or scar tissue in overused muscles. ART was done on the patient's lower erector spinae musculature as well as his gluteus muscles. Following treatment of two weeks he no longer complained of foot pain and his mother reported that he was dry about half the nights since his previous visits. Aaron then required 10 more adjustments before his bedwetting totally resolved [29]. It is important to note that both patients suffered from psychological problems as well; however neither patient's psychological

records were included in the final analysis. This again shows another study that is limited due to the inconclusive reports of outside therapies and their overall affects combined with chiropractic.

A study done by Zell was on a 7 year old female who suffered from both asthma and nocturnal enuresis. The Doctor was informed the child had suffered from asthma attacks since she was a 3 year old and was constantly coming down with colds and the flu. The mother of the child reported that her daughter would cough up phlegm following each asthma attack and the child was hospitalized twice following severe attacks. After the assessment the chiropractic examination revealed subluxations at the levels of S2, L4, L3, T12, T5, and C2. The patient also was considered to be overweight for the average 7 year old. When the mother was asked about the young girls diet she simply stated that she ate whatever was available which included a great deal of processed food and very few whole foods. The patient was adjusted 2 times a week for the first two weeks and diversified technique and activator technique was used to adjust the patient. The mother reported that the daughter was dry after the fifth visit and the child was seen three more times within the same month and then treatment ceased [30]. The study stated that dietary advice was sought out but it did not include if the chiropractor gave the advice or if it was done by an outside expert. The actual dietary advice as well as fluid consumption was never discussed in detail; however, it did state how well chiropractic works with dietary treatment [30].

In another case done by Crystal, a 6 year old boy came in suffering from nocturnal enuresis, ADD, and toe walking. The boy was noticed walking in with his heels 4 inches off the ground. The boy had sought out medical specialists that

recommended both Achilles' tendons to be cut and both ankles broken to achieve normal posture and gait. After the assessment, subluxations were found at the atlas (C1), T11 to T12, and the sacrum and pelvis. The child was seen for four weeks and following his last visit on the fourth week his heels had dropped 2 inches and his bedwetting frequency decreased to only 2 to 3 times per week. His medical doctor was shocked at his recovery under chiropractic care. This case demonstrated the effects chiropractic has on pure musculoskeletal problems; however nothing was ever stated about the patients ADD problems [31].

A study done by Langley was of an 8 year old female with an extensive history of medical problems. The young girl came in a history of epilepsy, heart murmurs, hypoglycemia, nocturnal enuresis, and ADD. The medical profession had explained to this child's parents that she would never function as a normal child, meaning no bike riding, swimming pools, or other strenuous activities. The history stated that the child was experiencing bedwetting every night, 10 to 12 seizures per day, frequent mood swing, and stomach pains along with diarrhea. The parents also stated that the girl had been placed into a special education class because she was considered "learning disabled." The family has sought out five pediatricians, three neurologists, and six psychiatrists. The young girl had been hospitalized ten prior times and been placed on an extensive amount of medication. After the child's chiropractic assessment was done adjustments were given to the patient's C1 and C2 levels as well as her sacrum using an activator. She was adjusted three times a week for two weeks and the bedwetting began to resolve and completely resolved after 6 months. During that period, her attention deficit disorder resolved and she left her special education classes to enter regular fifth

grade classes. Her seizures diminished to 8-10 per week after one year of care. She was released from psychiatric care as "self managing." Her resistance to disease increased and she can now ride a bike, roller skate and ice skate like a normal child. The child is expected to be off all medication within a month's release of the study [32].

Regan, another chiropractor, performed a study using multiple patients who suffered from a multitude of different female medical problems, but all were experiencing nocturnal enuresis. The patient's ages ranged from 18 to 35. All 8 patients in the study had previously seen medical physicians and were given pelvic exams, upper GI studies, and pap tests which all turned out to be negative for active pathology. Six subjects were selected in the treatment group while the other two were not treated in the control group. No patient had any type of low back, dorsal or cervical spine pain prior to being a patient in this program. Each patient was given chiropractic adjustments in there sacral and lower back regions using the diversified technique along with the Sacro-Occipital Technique. Among the women with menstrual problems, all cases of pelvic pain and severe cramping had ceased. All patients experiencing gastric problems responded well to chiropractic care except one and no one was taken of their medication or put on a special diet. Seven out of the eight patients suffering from nocturnal enuresis had increased there number of dry nights after the first two weeks of treatment while the eighth patient was in the control group [33].

The last case reviewed was done by Gemmel and Jacobson on a 14 year old boy with a severe case of nocturnal enuresis. The boy's history had described him never experiencing a "dry night his entire life [34]." Medical physicians tried the bell and pad method which is where a bell would ring while the patient is sleeping to wake up to go to

the bathroom; however, the treatment failed. A combination of Gonstead and SOT techniques were used on the patient's sacral and low back area at L4 and L5. The boy saw improvement after the first adjustment and coming back after his first ever dry night. Over the next three weeks the patient stayed dry 15 nights and the other nights were only damp nights, which is better than wet nights. The patient still suffers from an occasional wet night; however, chiropractic treatment helped decrease the overall amount of wet nights [34]. This young boy came in and was reported to have psychological problems as well which were not touched upon. The study demonstrated the benefits of chiropractic care, but also showed that chiropractic alone is not always the cure for all cases.

CONCLUSION

Nocturnal enuresis is a complex problem which involves several mechanisms, some of which are not entirely understood. Certain physical, mechanical, nutritional, as well as psychosocial problems can all cause forms of nocturnal enuresis. For the clinician, it is extremely important to be familiar with these mechanisms so the appropriate treatment can be rendered.

A substantial amount of research exists on the topics of enuresis, however, there is considerably less work that exists and addresses chiropractic management of nocturnal enuresis. PubMed and MANTIS searches generated over 1,000 articles on nocturnal enuresis and generated over 400 articles on the treatment of nocturnal enuresis. Chiroweb, ICL, and EBSOHost searches all together generated over 90 articles on the chiropractic treatment of nocturnal enuresis. Less than 60 of the articles discussed all three topics of nocturnal enuresis, chiropractic adjusting, and other treatment methods used in managing or alleviating nocturnal enuresis. There were actually very few studies

that mentioned all three topics and went into detail of how well chiropractic and other therapies work together in combination. The Reed, Beavers, Ready, and Kern study, the van Poecke and Cunliffe study, and the Hugh study were the only studies that really went into depth over how well combining chiropractic with psychosocial and/or nutritional therapies [1, 7, 29].

Chiropractic research thus far has tried to prove its effectiveness in treating and managing nocturnal enuresis. Research has shown that chiropractic works best dealing with musculoskeletal trauma or dysfunction as well as in combination with other therapies [26]. Techniques that have proven to be effective in treatment include Diversified technique, Gonstead technique, Sacral Occipital Technique, Activator, and Active Release Technique [26-34]. It was also proven in the studies that these different force techniques are equally effective when applied to the correct spinal segment. The effective combination therapies according to research include nutritional and fluid intake therapy along with psychological therapy. Research again shows how important it is for the chiropractor to understand the significance of these other therapies especially psychological [8]. Some factors to be aware of when treating with a nocturnal enuresis patient include abuse, neglect, and anxiety and should always be reported to child services [8, 16].

The studies referenced provide evidence of chiropractic's effectiveness in treating patients who struggle with nocturnal enuresis; however, the research comes up short in describing the correlation with combination therapy. It describes the benefits yet fails to describe in detail particular nutritional therapy or psychosocial therapy that works best in combination with the different chiropractic techniques. Further research is needed to

look closer at the direct correlation in the combination therapy for patient's suffering from nocturnal enuresis. This author hopes that researchers will soon answer the calling to publish more work focusing on empirical evidence for treatment plans which address nocturnal enuresis and chiropractic's success with it. Additional studies that combine chiropractic treatment with understanding of psychosocial factors and nutritional therapy might add to our understanding and provide more potential treatment ideas. Research demonstrates both chiropractic's strengths as well as its limitations in treating patients with nocturnal enuresis. It is our duty as chiropractors to not only care for these patients but also to educate and demonstrate the benefits.

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