Escola Superior de Saúde Atlântica

Osteopathy Degree

Monography

Cranial Osteopathy Techniques as a treatment in a seven-month-old baby with sleep disorder: a case report

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Cranial Osteopathy Techniques as a treatment in a seven-month-old baby with sleep disorder:
a case report – Osteopathy Degree

"Sleep loss is a signal of pain and suffering that may lead to mental disorders, whereas
excessive diurnal somnolence indicates the existence of disease."

Hippocrates

I dedicate this work to my husband who taught me that

the dream of one of us is the dream of both.

Acknowledgements

Abbreviations

BISQ - Brief Infant Sleep Questionnaire

BISQ-R-SF - Brief Infant Sleep Questionnaire Revised Short Form

CC - Cranial Concept

CTG - Cardiotocography

COT- Cranial Osteopathy Techniques

CV4 - Compression of the Fourth Ventricle

CRI - Cranial Rhythmic Impulse

MSNA - Muscle Sympathetic Nerve Activity

PRM - Primary Respiratory Mechanism

SBS - Sphenobasilar Synchondrosis

Abstract

Background: The present study aims to describe the case of a seven-month-old baby patient with sleep disorder who underwent treatment with Cranial Osteopathy Techniques (COT).

Design: A case report, illustrating how COT may have contributed to sleep quality improvement, is presented. The patient received a four-week treatment. Pre- and post-intervention changes were assessed by the filling out of the patient's medical record and feedback sleep information collected by the parents' filling out of the Brief Infant Sleep Questionnaire revised version (BISQ-R-SF), during the 1st, 2nd, 3rd, and 4th week of intervention.

Results: An improvement in sleep quality was noticed and reported by the parents. BISQ parameters: total nighttime sleep/number of night wakings were found to be inversely covariated ($r = -1$) and number of night wakings/duration of night waking were found to have a direct proportional covariation ($r = 0,9813$). The parameters: Primary Respiratory Mechanism (PRM)/total nighttime sleep and PRM/number of night wakings showed a strong negative and strong positive correlation respectively ($r = -0,911$; $r = 0,911$).

Conclusions: The findings from this single case study provide clinical support for considering COT in future clinical trials.

Keywords: sleep disorders, cranial osteopathic techniques, BISQ

Resumo

Resumo: O presente estudo visa descrever o caso de uma paciente de sete meses de idade com distúrbio do sono submetida a tratamento com Técnicas de Osteopatia Craniana (COT).

Desenho: Este trabalho trata-se de um estudo de caso que pretende ilustrar como as COT podem ter contribuído para a melhoria da qualidade do sono. A paciente com distúrbio do sono recebeu tratamento durante um período de quatro semanas. As alterações pré e pós-intervenção foram avaliadas através dos dados do preenchimento da ficha clínica da paciente e do preenchimento, pelos pais, do Questionário Breve do Sono Infantil versão revista (BISQ-R-SF), durante a 1ª, 2ª, 3ª, e 4ª semanas de intervenção.

Resultados: Os pais identificaram e relataram uma melhoria na qualidade do sono da bebé. Os parâmetros do BISQ: sono noturno total/número de despertares noturnos apresentaram uma covariação inversamente proporcional (r = -1) e o número de despertares noturnos/duração do sono noturno apresentaram uma covariação diretamente proporcional (r = 0,9813). Os parâmetros: Mecanismo Respiratório Primário (PRM)/sono noturno total e PRM/número de despertares noturnos apresentaram uma forte correlação negativa e forte correlação positiva respetivamente (r = -0,911; r = 0,911).

Conclusões: Os resultados deste estudo de caso fornecem informação clínica suficiente para permitir considerar as COT em futuros ensaios clínicos de maior robustez científica.

Palavras-chave: perturbações do sono, técnicas osteopáticas cranianas, BISQ

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Introduction

Sleep is an area of children's life functioning that occupies a large part of their day and presents itself as a challenge for both parents and children. Sleep is essential for normal growth and development, both in the child's physical and emotional aspects. It plays an important role in modulating the early relationship between parents and babies, in addition to their biological development (Salavessa & Vilariça, 2009). Sleep is, therefore, fundamental in learning how to separate the baby from the parents. It favors, under normal conditions, the development of self- regulation processes which are fundamental to emotional development and future social interactions (Salavessa & Vilariça, 2009).

In the presence of sleeping problems, it is important to recognize whether the situation is transient and self-limited related at some degree to a stage of development, or if it relates to some other underlying condition such as organic disease.

According to literature COT may influence the neurovegetative system, reducing sympathetic activity on the hypothalamic adrenal pituitary system and the retinal hypothalamic pineal gland system. It stimulates melatonin production and stabilizes the membranes of reciprocal tension, contributing to positive effects on sleep quality by regulating the processes of homeostasis (Lim, 2016).

Development of Sleep Patterns in Infants and Young Children

Over the first year of life, infant sleep patterns change. Newborns usually sleep most of the day and night, waking only for feeding every 1–3 hours, whereas a typical 1-year-old sleeps 10–12 hours at night without waking, followed by two daily naps. Over the first few months, the ability to retain calories increases; caloric need and growth relative to size decreases (Bathory & Tomopoulos, 2017).

By 6 months, babies should have consolidated sleep, with a long stretch of sleep at night, usually including 0–2 feeds overnight. During nighttime sleep, there are a number of *physiologic* arousals that occur in between sleep cycles. These arousals can be disruptive to sleep if an infant does not move directly into the next sleep cycle, by falling back asleep. Infants who have learned to self-soothe and self-initiate sleep are more likely to fall back asleep more rapidly after these arousals, without signaling parents, thus allowing them to further consolidate sleep. Acquisition of new skills and abilities can affect infant sleep

(Bathory & Tomopoulos, 2017). Regular habits benefit young children by providing them with a sense of predictability and security, helping with swap between activities and also moderate impulsivity and self-regulation (Bathory & Tomopoulos, 2017).

Presence of regular bedtime habits improves sleep, both sleep latency (time to fall asleep) and frequency of night waking in infants and toddlers. One of the most important learned sleep behaviors in infancy is the ability to self-soothe and fall asleep independently (Bathory & Tomopoulos, 2017).

This ability to self-soothe allows infants to more rapidly return to sleep after the many physiologic arousals that occur throughout the night, and thus have more consolidated and less fragmented nighttime sleep.

Appropriate sleep-onset associations include a bedtime routine that is consistent, age appropriate, and helps a young child become sleepy, but leaves them to go from drowsy to asleep on their own. For young infants, starting between 2 and 4 months of age, this usually means feeding or rocking and then laying them down in crib drowsy but awake. For older infants (4 to 6 months old) and toddlers, this usually entails a bedtime routine followed by being put into crib or bed drowsy but not yet asleep (Bathory & Tomopoulos, 2017).

Primary Respiratory Mechanism (PRM)

The cranial concept (CC) was originally introduced and developed by W.G. Sutherland (1873–1954) and can be regarded as part of the osteopathic approach in manual medicine (Sutherland, 1990).

The physiological aspect of the CC is built on two main hypotheses: (1) the idea of mobility within the osseous and membranous structures of the skull, the hypothesis of cranial mobility; (2) the ''primary respiratory mechanism'' (PRM), an autonomous rhythmic phenomenon inherent to every living organism, independent of thoracic respiration and cardiac pulse (Sutherland, 1990).

The PRM cyclic changes are represented by an expanding phase called flexion and a contracting phase called extension. Many authors report that palpation of the PRM is easier at the parietals, the squamous part of the occipital bone, the greater wings of the sphenoid bone and the sacrum (Upledger, 1977). Palpation can be regarded as one of the main tools for structural diagnosis in manual medicine together with observation, percussion and auscultation (DeStefano, 2017).

The PRM, palpated as the cranial rhythmic impulse (CRI) by a trained examiner, consists of a cyclic movement having a rate described as 4–14 cycles per minute. It is separate from pulmonary respiration and the cardiovascular pulse (Sergueef, 2011). It has been demonstrated to be associated with the low frequency Traube–Hering–Mayer[1] oscillation, a manifestation of sympathetic tone within the autonomic nervous system (Ghali & Ghali, 2020). In the peacefully resting individual, pulmonary respiration commonly becomes entrained with the rhythm of the PRM (Sergueef, 2011).

No reference to PRM values for paediatric ages was found from research in speciality books, scientific articles available online and from osteopaths who have been working in the area of paediatrics for over 20 years. In this study the patient's PRM was felt for 15 seconds and multiplied by 4 in order to obtain an approximate value of the cycles in one minute.

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[1] Mayer waves may synchronize overlapping propriobulbar interneuronal microcircuits constituting the respiratory rhythm and pattern generator, sympathetic oscillators, and cardiac vagal preganglionic neurons. Initially described by Sir Sigmund Mayer in the year 1876 in the arterial pressure waveform of anesthetized rabbits, authors have since extensively observed these oscillations in recordings of hemodynamic variables, including arterial pressure waveform, peripheral resistance, and blood flow (Ghali & Ghali, 2020).

1. Case presentation

1.1. Patient Information

The present study describes the case of a seven-month-old baby girl patient. Her delivery was performed by cesarean section at 36 + 5 days for presenting poor Cardiotocography (CTG) reactivity and low percentile (25). At birth she weighed 2.330gr and measured 46cm in length. Her Apgar score was a 7 at the first minute and a 9 at the fifth minute, there was no need for neonatal care. The reason for the osteopathy appointment was that she woke up an average 7 times per night.

She exhibited no present or previous pathologies and wasn´t under any sleeping drug. During the day, the baby took two naps of approximately 1 hour: one at 11 am and the other at 3.30 pm. During the day the baby seemed to be in a good mood, socially interacting, eating with appetite and good tolerance. She still breast fed twice a day (usually before bed at 11am and when she woke up the first time at night) and usually woke up for six to seven times during the night period.

2. Case Report objectives and Method

The purpose of this study was to determine the effectiveness of cranial osteopathy techniques used in infant with sleep disorder. This was a single case report study. Patient was selected by convenience and consisted of a seven-month-old baby girl with sleep disorder who went to a private osteopathy clinic for treatment. The first appointment consisted of the study´s explanation, parents received oral and written information and signed an informed consent[2] according to the Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects[3] available in appendix.

They also filled the BISQ-R-SF questionnaire based on baby's sleep quality during the week prior to the beginning of the study, respectively. The baby received a 30-minute osteopathic treatment. In week 2 and 3, the baby repeated the same 30-minute treatment and parents filled the BISQ-R-SF. In week 4 parents filled BISQ-R-SF and no treatment took place. The medical record was filled out in the beginning of each appointment.

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[2] The Informed Consent is available in appendix 4.

[3] World Medical Association Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects, Clinical Review and Education, 2015, pages 2191-2194.

3. Diagnostic Assessment

In order to obtain information about the baby's sleep quality we used the BISQ- R-SF and the filling out of the medical record, on a weekly basis during a four-week period.

3.1. Measures

Given the impact that sleep has on mental health and that it is difficult to make adequately define and quantify it, instruments are needed for its evaluation and measurement that can decrease the bias due to subjectivity. Some existing scales require
the person to answer retrospectively according to what he/she recalls of his/her quality of sleep during the last month. All of the knowledge on sleep has been applied to the development of scales designed to evaluate sleep characteristics and disorders in the child, adolescent and adult population (Lomeli, et al., 2008).

3.1.1. Brief Infant Sleep Questionnaire

The Brief Infant Sleep Questionnaire (BISQ) an assessment measure of infant and toddler (0-36 months) sleep patterns, sleep ecology, and parental perceptions of sleep, has been used in over 50 studies since its first publication by Sadeh in 2004 (Mindell, et al. 2019). It has been expanded and revised from its original form and widely used in studies throughout the world. An age-based norm-referenced score has been developed and is currently based on United States data, with the intention of development of norms in other countries[4]. In this study we used the BISQ-R SF[5] (short form) and analyzed three of the nineteen questions that characterize sleep specifically as shown in Table 1, which were considered the ones of most interest for the study.

3.1.2. Medical Record

Osteopathic assessment data is available in appendix[6] and consisted of an Osteopathic physical, motor and cognitive evaluation age related. The medical record was filled out in each appointment during the four-week treatment.

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[4] Pediatric Sleep Council. Babysleep. 2021. Brief Infant Sleep Questionnaire – Revised. Web. 2 December 2020. *http://www.babysleep.com.*
[5] The BISQ-R SF is available in appendix 1.
[6] Medical record is available in appendix 2.

4. Clinical Findings

The baby presented an osteopathic evaluation globally without dysfunctions and with a motor/cognitive development compatible with her age. The following findings were identified during cranial and sacral evaluation: Sphenobasilar Synchondrosis (SBS) cranial extension dysfunction (with "premature head presentation") and internal rotation dysfunction of the temporal bones (bilaterally). The Primary Respiratory Mechanism (PRM) wasn't harmonious nor rhythmic nor regular on its cycles. Sacrum was in extension dysfunction as well.

Cranial and sacral parameters evaluation were analyzed in order to collect information that could be related to the baby's sleep quality as shown in Table 2. We categorized the SBS extension dysfunction variable as 1, no dysfunction as 2 and internal rotation of the temporal bones as 3.

5. Intervention

After the osteopathic evaluation, it was decided to treat the patient with three randomly ordered treatments (focusing on the identified dysfunctions and sleep promoting enablers): Compression of the Fourth Ventricle (CV4), Global Equilibration of intracranial membranes and Equilibration of the tentorium cerebelli. These techniques are described as profoundly relaxing (Cutler, et al. 2005), facilitate harmonious function between the three diaphragms: cranial, thoracoabdominal and pelvic, correct the temporal bone imbalances, promote venous sinus drainage and balance the hypophysial fossa (Sergueef, 2011).

6. Study Results

The results of the filling out of the BISQ- R-SF and the filling out of the medical record, are presented in the tables below.

Table 1. Sleep- Wake Patterns for Infants (BISQ-R-SF)

Variable	1st Appointment	2nd Week	3rd Week	4th Week
Number of night wakings	7	5	3	2
Duration of night wakings (min)	45	30	15	15
Total nighttime sleep (hours)	2	4	6	7

Table 2. Cranial and Sacral Evaluation

Variable: Cranial Evaluation	1st Appointment	2nd Week	3rd Week	4th Week
SBS	1	1	2	2
Temporal Bones	3	2	2	2
PRM (cpm)	48	44	24	20
Variable: Sacral Evaluation	1st Appointment	2nd Week	3rd Week	4th Week
SBS	1	1	2	2

SBS – sphenobasilar synchondrosis, PRM – primary respiratory mechanism, SBS extension dysfunction– 1, no dysfunction – 2, and internal rotation of the temporal bones – 3; The PRM cycles were counted for about 15 seconds and multiplied by 4. This way they represent an approximate number of respiratory cycles per minute.

After the first week the overall baby's assessment was similar. The cranial and sacrum SBS dysfunctions were corrected after the second treatment. The temporal bone dysfunctions were corrected after the first treatment and PRM had lower cycle frequency after the second treatment as shown in Figure 1.

Figure 1. PRM cycle per minute during the treatment (4-week period)
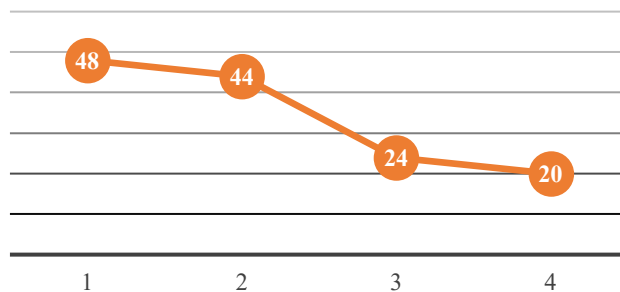
According to the filling out of BISQ scores, it can be observed that the sleep parameters studied improved after the second treatment. On the fourth week of treatment the baby only woke up twice a night, for periods of 15 minutes and slept for about 7 hours in total as shown in Figure 2.

Figure 2. Number of night wakings, Duration of night wakings (min) and Total nighttime sleep (hours) during the treatment (4-week period)
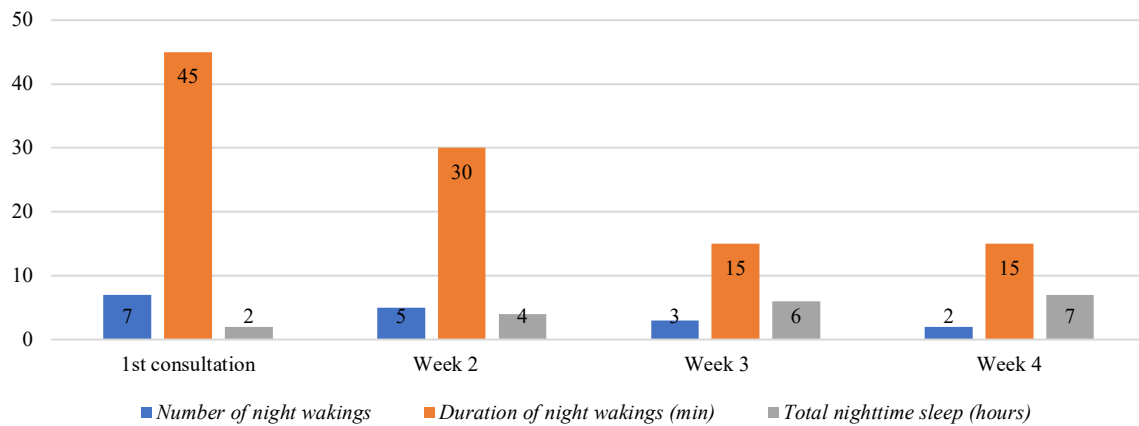
7. Data Analysis

Data[7] was analysed using 2010 Excel software. To analyze the intensity and direction of the relationship between two variables we used the Pearson Correlation Coefficient Test. We analyzed the relationship between total nighttime sleep and number of night wakings; number of night wakings and duration of night waking; PRM and total nighttime sleep and PRM and number of night wakings. The results of Pearson Correlation Coefficient test application is resumed in Table 3.

Table 3. Pearson Correlation Coefficient test between sleep and osteopathic evaluation variables

Variable: Cranial Evaluation	*Pearson Correlation Coefficient Test*
Total nighttime sleep/number of night wakings	r = -1
Number of night wakings/duration of night waking	r = 0,981
PRM/ total nighttime sleep	r = - 0,911
PRM/ number of night wakings	r = 0,911

(r = Pearson Correlation Coefficient. Pearson's r can range from -1 to 1. An r of -1 indicates a perfect negative linear relationship between variables, an r of 0 indicates no linear relationship between variables, and an r of 1 indicates a perfect positive linear relationship between variables)

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[7] Excel data analysis is available in appendix 3.

8. Follow-up and Outcomes

In order to assess the long-term effects of the osteopathic treatment, a follow up program will take place and will correspond to a monthly follow up of the baby's sleep patterns for a six-month period.

9. Discussion

The study´s results may suggest that the osteopathic treatment contributed to the baby's sleep quality improvement.

It has been postulated that the CV4-induced still point is associated with decreased sympathetic tone. However, most of the data suggesting the aforementioned is limited (Magoun, 1976). For example, Magoun demonstrated a decrease, compared to baseline, in electrical skin resistance after 3 minutes of CV4. He concluded that a decrease in electrical skin resistance was an indication of a decrease in sympathetic nerve activity (Magoun, 1976). Although this conclusion may be accurate, it would only be an estimation of skin sympathetic nerve activity, which is primarily involved in temperature regulation, and not an estimation of muscle sympathetic nerve activity (MSNA), which is a better marker of global sympathetic activity (Cutler, et al. 2005).

It can also be suggested that there is a reciprocal relationship between the PRM and sleep quality. Study´s results show a strong positive correlation between the variables PRM/ number of night wakings ($r = 0{,}911$) and a strong negative correlation between PRM/ total nighttime sleep; therefore, we can postulate that the more normorithmic the PRM is, the less interrupted the sleep will be as shown in Figure 3.

Figure 3. Number of night wakings and PRM cycles during the treatment (4-week period).
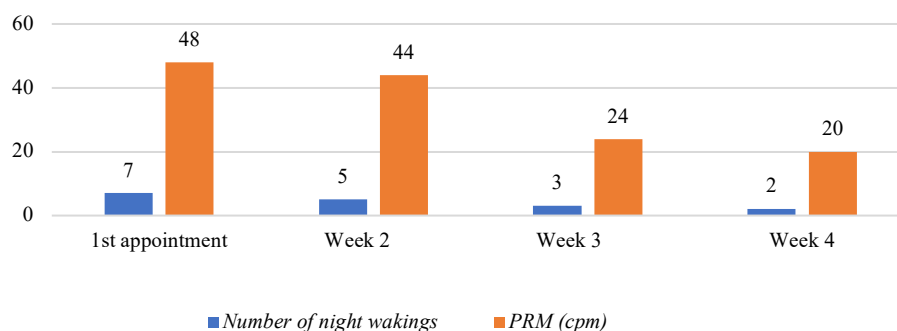
Cranial mobility as well as the physiological basis of the PRM is still a matter of discussion (Klein P, 1985). The movements or changes induced by the PRM are thought to be very small, so the observation of that phenomenon is taking part near the limits of tactile perceptible events (Upledger, 1977) and requires special training as already stated by Sutherland himself (Sutherland, 1990).

No reference to PRM values for paediatric ages were found from research in speciality books, scientific articles available online and from osteopaths who have been working in the area of paediatrics for over 20 years. In this 7-month-old patient's evaluation, the PRM oscillated between 48 and 20 cpm. These numbers are far from the standard values described for individuals in general: 4-14 cpm (Sergueef, 2011), but are close (from week 3 on) to the age-appropriate values of lung breathing cycles: 31-52 ppm (Fleming, et al., 2011). These results may suggest that, in fact, in the peacefully resting individual, pulmonary respiration commonly becomes entrained with the rhythm of the PRM (Sergueef, 2011).

10. Possible risk of Biases to the Study

Some aspects may have contributed to compromising the scientific robustness of the study : (1) the fact that the osteopath had expectations that the study´ results would show an improvement in baby's sleep quality after the osteopathic techniques have been applied; (2) the data collection tools lack subjectivity since the report on the baby´s sleep quality evolution was given by the parents; (3) the PRM assessment is subjective and may compromise as well the scientific value of this case report.

Conclusion

Results from this single case report create an interesting and clear precedent for considering COT in future clinical trials. This study´s results may also suggest a potential reciprocal relationship between the PRM and sleep quality, however, more recent and robust studies are needed to determine the scientific validity of PRM palpation and the standard values for paediatric age.

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Appendix

Appendix 1

The Brief Infant Sleep Questionnaire – Revised Short Form

Brief Infant Sleep Questionnaire – Revised Short Form

Please answer a few questions about your family.

1. What is your relationship to your child?

☐ Mother ☐ Grandparent ☐ Father ☐ Other

2. What is the highest degree that you completed?

☐ Less than high school/secondary

☐ High school/secondary

☐ College/university

☐ Graduate (e.g., MS, MD, JD, Ph.D.) ☐ Prefer not to answer

3. How old is your child (in months)?

_____months

4. Was your child premature (born before 37 weeks' gestation)?

☐ Yes

☐ No

☐ I don't know

5. My child's biological sex is

☐ Male

☐ Female ☐ Intersex

6. In which country/region do you currently reside?

Country/region: _____

7. How many nights per week are you involved with your child at bedtime and/or overnight?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 nights

Please think about your child's sleep during the past two weeks in answering the following questions.

1. What time do you usually start your child's bedtime routine (start getting your child ready for bed)?

Example: 7:45 PM would be written as _____7_:_45_PM

I start getting my child ready for bed at _____:_____

2. In a typical week, how often does your child have the exact same bedtime routine?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 nights

3. Where does your child usually fall asleep at bedtime?

☐ Crib

☐ Own bed (any size)

☐ Parents' bed

☐ Co-sleeper (attached to parents' bed)

4. How does your child usually fall asleep at bedtime?

☐ Bassinet/infant seat

☐ Swing/stroller

☐ Parent's/adult's arms

☐ Other

☐ While being held or rocked

☐ With an adult in the room, but not being held or rocked ☐ On own (without an adult in the room)

5. At bedtime, does your child usually fall asleep while breastfeeding, bottle feeding, or drinking from a sippy cup?

☐Yes ☐ No

6. What time do you usually put your child to bed at night (lights out)?

Example: 8:30 PM would be written as ____8__:_30_PM

I put my child to bed at _____:_____

7. Typically, how difficult is bedtime?

☐ Very easy

☐ Somewhat easy

☐ Neither easy nor difficult ☐ Somewhat difficult

☐ Very difficult

8. How long does it usually take your child to fall asleep?

Example: If you put your child to bed at 6:30 pm and your child falls asleep at 8:00 pm, it takes 1 hour and 30 minutes for your child to fall asleep.

_____ hours _____ minutes

9. In what room does your child sleep for most of the night?

☐ In his/her own room ☐ In parents' room

10. Where does your child sleep for most of the night?

☐ Crib

☐ Own bed (any size)

☐ Parents' bed

☐ Co-sleeper (attached to parents' bed)

☐ In sibling's or other bedroom ☐ In another room of the house

☐ Bassinet/infant seat ☐ Swing/stroller

☐ Other

11. How many times does your child usually wake during the night?

_____ times per night

12. When your child wakes up during the night, what do you usually do? (check all that apply)

☐ Pick up my child and put him/her back down while still awake

☐ Bottle feed or give a sippy cup to put my child back to sleep

☐ Breastfeed/nurse my child back to sleep

☐ Play with my child, watch TV, or use/show smartphone/tablet

☐ None of these

13. How much total time during the NIGHT is your child usually awake (between when your child goes to bed and wakes for the day)?

Example: If your child wakes up 2 times and is awake for about 15 minutes each time, your child's total time spent awake is 30 minutes. In that case, write "0 hours, 30 minutes."

_____ hours

_____ minutes

14. What is the longest stretch of time that your child is asleep during the NIGHT without waking up?

_____ hours _____ minutes

15. What time does your child wake up in the morning?

My child wakes up at _____:_____

16. How much total time does your child spend sleeping during the NIGHT (between when your child goes to bed and wakes for the day)?

Example: If your child sleeps for 3 hours, wakes up, then sleeps for 5 hours and 30 minutes more, your child sleeps for 8 hours and 30 minutes total.

_____ hours _____ minutes

17. How well does your child usually sleep at night?

☐ Very well ☐ Well

☐ Fairly well ☐ Poorly

☐ Very poorly

18. On a typical DAY, how many naps does your child take (between when your child wakes for the day and goes to bed at night)?

_____ naps

19. How much total time does your child spend sleeping during the DAY (between when your child wakes for the day and goes to bed at night)?

Example: If your child took 2 naps and slept 1 hour each time, your child's total time spent sleeping during the day is 2 hours.

_____ hours _____ minutes

20. Do you consider your child's sleep a problem?

☐ Not a problem at all ☐ A very small problem ☐ A small problem

☐ A moderate problem ☐ A serious problem

Appendix 2

Medical Record

**Consultório de Osteopatia Obstétrica
Pediátrica Susana Wilton**

1ª 28/9
2ª 5/10
3ª 12/10
4ª 19/10

Recém-nascido / Criança / Adolescente

Consulta nº: 1
Data: 28/9

Nome: Maria
Género: Feminino
Data de nascimento: 22/2/20

RN: (Cefálico)   Pélvico   Transverso   P. anterior   P. posterior
Local do parto: Hp. Luz   às 36+5 sem. por percentil (25) e
pouco reactividade do CTG
Tipo de parto: Eutócico
  (Cesariana)
  Fórceps
  Ventosa.
Peso ao nascer (kgr): 2.380 gR
Comprimento: 46 cm
Perímetro Cefálico:
Índice de Apgar ao 1ºminuto 7   ao 5º minuto 9
Reanimação: sim/   não

Motivo da consulta: Bebé acorda uma média de 7x por noite.
por períodos de 45'. Dorme cerca de 2H.

Primeiro ano de vida: 0 aos 3 meses
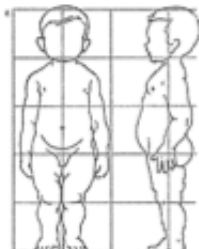
Observação física:

	0-3 meses	3-6 meses	6-9 meses	9-12 meses
Cabeça e pescoço:			Sustendo bem a cabeça, força aumentada no pescoço. - Fontanela anterior encerrada - Fontanela Lambdoide inexistente	

Avaliaç _MRP_ - Amituico, irregula, frequenc médic de _48 cicls_.
Craniana - SBS eu disfunç de extensão ("cabeça de
preuetelo"). Ossos temporeis → rot. interna
bilateral.

Coluna vertebral / caixa torácica/ sacro:	Sf curuaduras fisiobicas cubrence idade.		
	→ Jã spresecte equilibrio de cimeu, quese sf c gio. (seuies).		
Sacro	→ Sacro eu disfunç de extensão.		
Complexo do ombro:	Apoic-se us autebrayos, mãos abertas ua liula media		
	- Tacuufere briuguedos		
	- Boa succehic de ceducecentos.		
Fémur, anca e pélvis:	- Seeu displasic		
	- Sf disfeuç ilracs au pluis.		
Membro inferior:	- Fac cpoio plauctar		
	- pé se seuta pehcameute seu cpoio.		
Pé e tornozelo:	→ sf disfeuß.		

Esquema Postural:

Avaliação Motora:

	0-3 meses	3-6 meses	6-9 meses	9-12 meses
Tónus:			Tónus mantido e simétrico	
Simetria de movimentos:				
Desenvolvimento motor:				

[handwritten notes spanning the 6-9 / 9-12 meses columns]
- Boa endireita motora. Sustenta
- cabeça, pescoço e tronco.
- Em decúbito vertical estende os braços e apoia as mãos paralelas à linha média.
- Mantém-se sentado quase se apoio.
- De pé, faz apoio plantar.

Avaliação Neurológica/ Sensitiva/ Emocional:

	0-3 meses	3-6 meses	6-9 meses	9-12 meses
Reflexos Neurológicos:			Babinsky negativo. Reflexos primitivos inibidos	
Visão:				
Audição:				
Desenvolvimento cognitivo/ emocional:				

[Visão – handwritten]
- Responde a estímulos visuais, dirige o seu olhar.
- Reflexo pupilar ok
- Reflexo convergente ok.

[Audição – handwritten]
- Responde a estímulos auditivos, dirige o seu olhar ao estímulo.

[Desenvolvimento cognitivo/ emocional – handwritten]
- Dá gargalhadas
- Afeto, reconhece e comunica.
- transfere objetos
- Exploração oral

Exames complementares de Diagnóstico:

N tas.

Precausões/ Contra-indicações:

N deea cale - indracies

Tratamento: 1ª Consulte

Tratamento osteopático apropriado: sim / não
Referir paciente: sim / não X
Urgência: sim / não X

Tratamento curto/médio/longo prazo: - CV_4
- Gquilibrio membraes de tensão Reciprocas
- Gquilibrio deude do cerebelo.

Prognóstico:
Presede se melboric
possivel de qual// suo, eciste uma boa integraf e lucupouf
dos peis los cuidadou ao Sebo. Gciste
Aconselhamento: - ume ectua de suo Restituide. Os
carcellos hau ser lucupidou co tic-c tic.
- Gusio de lut
- Toutaeu asestr
a Hiperuficieus
- Tebrico de boc pacutol://.
A partir do segundo ano de vida e até à adolescência

2ª Consulta – Maria acordava cerca de 5x's por noite
por períodos de 30'. Dormia, cerca de
4 h   Houve pequena melhoria

- MRP. 44 (mantém-se continuo, errático e
acelerado)
- Rotação interna dos temporais corrigida
- Mantém disfunção de extensão SBS crânio e
sacro.
- Tratamento realizado: Sobre punual.

3ª Consulta – Maria acorda cerca de 3x por noite,
por períodos de 15'. Dorme cerca de 6H
(Mto boa evolução)
- MRP. 24 (+ rítmico, harmonioso, menos
                                          ciclos)
- Sem disfunção de SBS crânio e sacro.
- Tratamento realizado: Sobre punual.

4ª Consulta – Maria acorda apenas 2x por noite,
por períodos de cerca de 15 minutos. Dorme
cerca de 7H.
- MRP. 20 cpm
- Sf disfunção craniana ou sagrada.
- Não fez tratamento

Appendix 3

Excel data analysis

Variable	1st appointment	Week 2	Week 3	Week 4
Number of night wakings	7	5	3	2
Duration of night wakings (min)	45	30	15	15
Total nighttime sleep (hours)	2	4	6	7

Number of night wakings, Duration of night waking (min), Total nighttime sleep (hours) during the treatment.
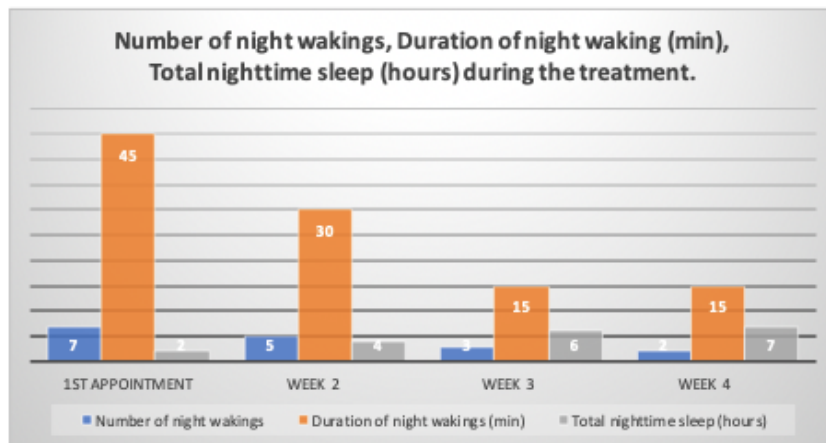
Variable	1st Appointment	Week 2	Week 4	Week 4
Number of night wakings	7	5	3	2
PRM cicles	48	44	24	20
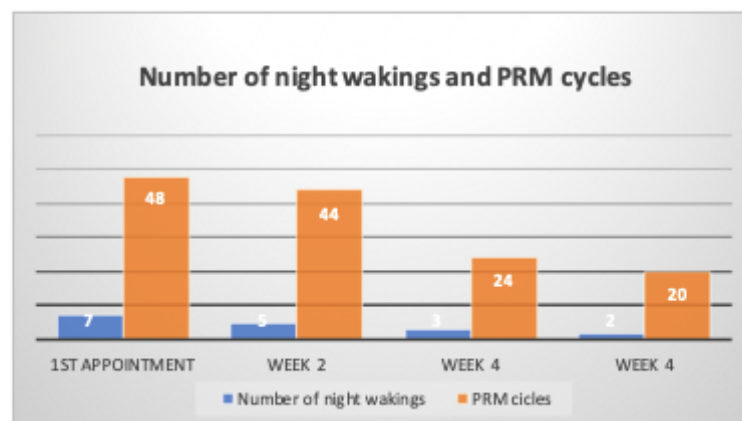
Number of night wakings and PRM cycles

Variable/ Cranial Evaluation	1st Appointment	Week 2	Week 3	Week 4
Cranial SBS	1	1	2	2
temporal bones	3	1	1	1
PRM (cpm)	48	44	24	20
Variable/ Sacral Evaluation	1st Appointment	Week 2	Week 3	Week 4
Sacral SBS	1	1	2	2

SBS extension	1
no disfunction	2
internal rotation bilaterally	3

PRM (cpm)
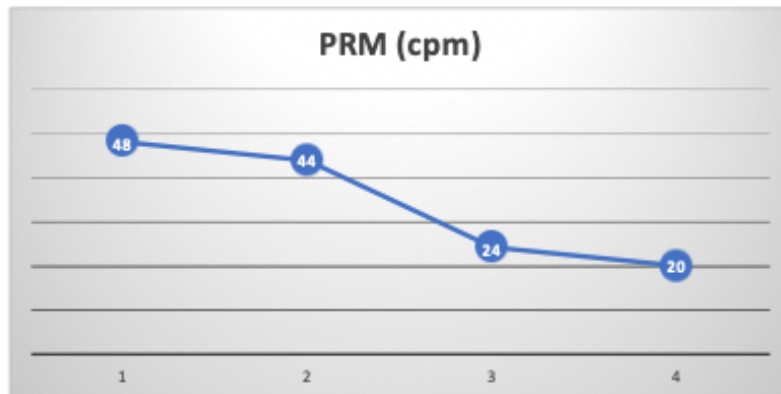
Variable/ Cranial Evaluation	1st appointment	Week 2	Week 3	Week 4
PRM	45	45	25	25
Total nighttime sleep (hours)	2	4	6	7

R de Pearson: PRM & total night sleep	
-0,911322377	Forte correlação negativa entre as duas variaveis

Variable/ Cranial Evaluation	1st appointment	Week 2	Week 3	Week 4
PRM	45	45	25	25
Number of night wakings	7	5	3	2

R de Pearson: PRM & number of night wakings	
0,911322377	Forte correlação positiva entre as duas variáveis

Variable	1st appointment	Week 2	Week 3	Week 4
Number of night wakings		7	5	3	2
Total nighttime sleep (hours)		2	4	6	7

R de Pearson entre x e z	-1
Perfeita correlação negativa- covariação é inversamente proporcional entre as variaveis	

Variable	1st appointment	Week 2	Week 3	Week 4
Number of night wakings		7	5	3	2
Duration of night wakings (min)		45	30	15	15

R de Pearson entre x e y	0,98133584
Perfeita correlação positiva-covariação diretamente proporcional entre as variaveis.	

Appendix 4

Free and Informed Consent

**FREE AND INFORMED CONSENT FOR SCIENTIFIC RESEARCH WITH
HUMAN SUBJECTS**

***CONSENTIMENTO INFORMADO LIVRE E ESCLARECIDO* PARA INVESTIGAÇÃO
CIENTÍFICA COM SERES HUMANOS**

Project´s or study´s Title: Cranial Osteopathy Techniques as a Treatment in a Seven Month
Old Baby with Sleep Disorder: a Case Report

Person responsible for the study: Susana Wilton Piegas

Host Institution: Atlântica University - ESSATLA

This document, named Informed Consent, contains important information regarding the study
you have been approached for and what to expect if you decide to participate in it. Please read
carefully all the information contained herein. You should feel entirely free to ask any
questions, as well as to discuss your decision to participate in this study with others (friends,
family members).

*Este documento, designado **Consentimento, Informado, Livre e Esclarecido**, contém
informação importante em relação ao estudo para o qual foi abordado/a, bem como o que
esperar se decidir participar no mesmo. Leia atentamente toda a informação aqui contida.
Deve sentir-se inteiramente livre para colocar qualquer questão, assim como para discutir com
terceiros (amigos, familiares) a decisão da sua participação neste estudo.*

General Information/ Informação geral
This questionnaire arises in the scope of the realization of the Monography paper work (a case report) framed in the degree course in Osteopathy. This study aims to describe the case of a 7-month-old baby with sleep disturbance whom, after having undergone on osteopathic treatment, showed an improvement in her sleep quality. This questionnaire is intended to be completed in about 10 minutes by the infant´s parents.

Este questionário surge no âmbito da realização do trabalho de Monografia (um estudo de caso) enquadrado no curso de licenciatura em Osteopatia. Este estudo visa a descrição de caso de um bebé de 7 meses, com distúrbio de sono e que após ter sido submetido a tratamento osteopático, apresentou melhoria da sua qualidade de sono. Este questionário pretende ser preenchido em cerca de 10 minutos pelos pais que realizaram este estudo consentido.

What is the expected duration of my participation? Qual a duração esperada da minha participação?

Four week study in which osteopathic treatment will be applied weekly, between the first and third consultations.

Estudo de quatro semanas em que o tratamento osteopático foi aplicado semanalmente, entre a primeira e a terceira consultas.

What are the study´s procedures in which I will participate? Quais os procedimentos do estudo em que vou participar?

Parents will complete the BISQ questionnaire weekly and the infants will receive a cranial osteopathic treatment that will include CV4 technique, Global Equilibration of intracranial membranes and Equilibration of the tentorium cerebelli.

Os pais irão preencher semanalmente o BISQ e a bebé irá receber um tratamento osteopático craniano que incluirá técnicas de: CV4, Equilíbrio global das membranas intracranianas e Equilíbrio da tenda do cerebelo.

Is my participation voluntary? A minha participação é voluntária?

Your participation is voluntary and you can refuse to participate. If you decide to participate in this study it is important to know that you can give up at any time, without any consequences for you.

A sua participação é voluntária e pode recusar-se a participar. Caso decida participar neste estudo é importante ter conhecimento que pode desistir a qualquer momento, sem qualquer tipo de consequência para si.

What are the possible benefits of my participation? Quais os possíveis benefícios da minha participação?
Improving my baby's sleep quality   *Melhoria da qualidade do sono do meu bebê*
What are the possible risks of my participation? Quais os possíveis riscos da minha participação?
This study does not present any health risks associated with the intervention for both the baby and /or parents *Este estudo não apresenta quaisquer riscos para a saúde, associados à intervenção para o bebé e /ou seus pais.*
How is the confidentiality of data ensured? Como é assegurada a confidencialidade dos dados?
The collected data will be saved on the investigator's personal computer. The confidentiality of the process is guaranteed through the use of codes to identify the participants. *Os dados recolhidos serão guardados no computador pessoal do investigador. A confidencialidade do processo garante-se através da utilização de códigos para a identificação dos participantes.*
What will happen to the data when the investigation ends? O que acontecerá aos dados quando a investigação terminar?
After the end of the investigation, the data will be kept by the researcher, using codes to identify the participants, always guaranteeing confidentiality.

Após o termino da investigação os dados serão guardados pelo investigador, utilizando códigos para a identificação dos participantes, garantindo-se sempre a confidencialidade.
How will the study´s results be disseminated and for what purposes? Como irão os resultados do estudo ser divulgados e com que finalidades?
The results will be published in scientific article format in scientific journals / newspapers, always guaranteeing the anonymity of the participants and the institution involved. *Os resultados serão divulgados em formato de artigo científico em revistas/jornais científicas/os, garantindo-se sempre o anonimato dos participantes e da instituição envolvida.*
In case of doubts who should I contact? Em caso de dúvidas quem devo contactar?
Susana Wilton Piegas Atlântica University - ESSATLA

Informed Consent´s Signature

I have read (or someone has read to me) this document and am aware of what to expect regarding my participation in the study: Cranial Osteopathy Techniques as a Treatment in a Seven Month Old Baby with Sleep Disorder: a Case Report. I have had the opportunity to ask all the questions and the answers have clarified all my doubts. Thus, I voluntarily agree to participate in this study. I have been given a copy of this document.

Assinatura do Consentimento Informado, Livre e Esclarecido

Li (ou alguém leu para mim) o presente documento e estou consciente do que esperar quanto à minha participação no estudo: Cranial Osteopathy Techniques as a Treatment in a Seven Month Old Baby with Sleep Disorder: a Case Report. Tive a oportunidade de colocar todas as questões e as respostas esclareceram todas as minhas dúvidas. Assim, aceito voluntariamente participar neste estudo. Foi-me dada uma cópia deste documento.

Participant´s name/ Nome do participante

Participant's signature/ Assinatura do participante

Date/ Data

Name of the legal representative of the participant (if applicable)/ Nome do representante legal do participante (se aplicável)

Degree of relationship with the participant/ Grau de relação com o participante

Researcher/ Research Team

The most important aspects of this study have been explained to the participant or his/her representative before asking for his/her signature. A copy of this document will be provided to you.

Investigador/Equipa de Investigação

Os aspetos mais importantes deste estudo foram explicados ao participante ou ao seu representante, antes de solicitar a sua assinatura. Uma cópia deste documento ser-lhe-á fornecida.

Name of the obtaining consent´s person/ Nome da pessoa que obtém o consentimento

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Signature of the obtaining consent´s person/ Assinatura da pessoa que obtém o consentimento

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Date/ Data