

UNIVERSITY OF SÃO PAULO  
SCHOOL OF NURSING  
GRADUATE PROGRAM IN NURSING

Alícia Rafaelly Vilefort Sales

**Associations between the duration and quality of sleep of pregnant women in the  
third trimester with the duration of labor**

São Paulo

2025

Alícia Rafaelly Vilefort Sales

**Associations between the duration and quality of sleep of pregnant women in  
the third trimester with the duration of labor**

**Preliminary version**

Thesis presented to the School of Nursing at the University of São Paulo, as a requirement for the degree of Master of Science by the Graduate Program in Nursing.

Area of concentration: Healthcare

Supervisor: Prof. Dr. Christiane Borges do Nascimento Chofakian

São Paulo

2025

I authorize the full or partial reproduction of this work by any conventional or electronic means for the purposes of study and research, provided that the source is cited.

Cataloging in publication  
Library  
School of Nursing

Sales, Alícia Rafaelly Vilefort

Associations between the duration and quality of sleep of pregnant women in the third trimester with the duration of labor / Alícia Rafaelly Vilefort Sales ; supervisor, Christiane Borges do Nascimento Chofakian. – 2025

15 p : il.

Thesis (Master of Science) – Graduate Program in Nursing, School of Nursing, University of São Paulo.

Preliminary version.

1. Pregnancy. 2. Sleep. 3. Childbirth. 4. Chronobiology. 5. Midwifery. I. Chofakian, Christiane Borges do Nascimento, super. II. Title.

Thesis by Alícia Rafaelly Vilefort Sales, under the title **Associations between the duration and quality of sleep of pregnant women in the third trimester with the duration of labor**, presented to the School of Nursing at the University of São Paulo, as a requirement for the degree of Master of Science by the Graduate Program in Nursing, in the concentration area of Healthcare.

Approved on

*Month*

*Day*

*Year*

Examination Committee

Committee Chair:

Prof. Dr.

Institution

Examiners:

Prof. Dr.

Institution

Evaluation

Prof. Dr.

Institution

Evaluation

Prof. Dr.

Institution

Evaluation

## **ACKNOWLEDGEMENTS**

I would like to acknowledge and express my gratitude to the following persons and organizations:

The Support Program for Student Permanence and Education (PAPFE) of USP, which enabled me to get this far.

The Coordination for the Improvement of Higher Education Personnel (CAPES), for funding this work and enabling my presence in graduate studies.

*Nullius in verba*<sup>1</sup>

---

<sup>1</sup> The Royal Society. (n.d.). *History of the Royal Society*. <https://royalsociety.org/about-us/history/>

## ABSTRACT

Sales, A. R. V. (2025). *Associations between the duration and quality of sleep of pregnant women in the third trimester with the duration of labor* [Master's Thesis, University of São Paulo].

The text below is related to the **project** of this thesis. The final abstract can only be produced when the research is completed.

Among the biopsychosocial changes that occur during pregnancy are alterations in the sleep-wake cycle pattern. Research suggests that there are associations between the duration and quality of sleep in pregnant women during the prenatal period and adverse maternal-infant health outcomes. The primary aim of this project is to investigate the presence/absence of significant associations between the duration and quality of sleep in pregnant women in the third trimester and the duration of labor. For this purpose, a study will be conducted with 133 pregnant women in the third trimester, followed up at SUS birthing centers located in the city of São Paulo. Demographic, anthropometric, obstetric, actigraphic, sleep-related, and psychological state data will be collected from the participants, in addition to secondary data from the women's medical records and prenatal books. The study has already obtained all necessary ethical approvals from the competent authorities. The results will be analyzed by comparing group means through an analysis of covariance (ANCOVA). The hypothesis is that poorer sleep quality and duration throughout pregnancy are associated with a longer duration of labor. In addition to training and capacitating professionals and generating knowledge on a public health issue, it is expected that this study will promote and contribute to the development of new services and technologies for monitoring pregnant women, highlighting the relevance of the sleep-wake cycle for maternal-infant health.

**Keywords:** Pregnancy. Childbirth. Humanizing Delivery. Natural Childbirth. Duration of childbirth. Obstetrics. Sleep. Sleep quality. Sleep Duration. Actigraphy. Chronobiology.

## RESUMO

Sales, A. R. V. (2025). *Associações entre a duração e a qualidade do sono de gestantes no terceiro trimestre com a duração do trabalho de parto* [Dissertação de Mestrado, Universidade de São Paulo].

O texto abaixo está relacionado ao **projeto** desta dissertação. O resumo final só poderá ser produzido quando a pesquisa for finalizada.

Dentre as alterações biopsicossociais que ocorrem durante a gravidez estão as mudanças no padrão do ciclo sono-vigília. Pesquisas sugerem que há associações entre a duração e a qualidade do sono de gestantes no período pré-natal com desfechos adversos na saúde materno-infantil. O objetivo deste projeto é investigar a presença/ausência de associações significativas entre a duração e a qualidade do sono de gestantes no terceiro trimestre com a duração do trabalho de parto. Para isso, será realizado um estudo com 133 gestantes no terceiro trimestre gestacional acompanhadas em casas de parto do SUS, localizadas no município de São Paulo. Serão coletados dados sociodemográficos, antropométricos, obstétricos, actigráficos, dados relacionados ao sono e ao estado psicológico das participantes, além de dados secundários dos prontuários e cadernetas das gestantes. O estudo já obteve todas as aprovações éticas para sua operação por parte das autoridades competentes. Os resultados serão analisados pela comparação das médias entre grupos por meio de uma análise de covariância (ANCOVA). A hipótese é que uma menor qualidade e duração de sono no final do terceiro trimestre gestacional estão associadas a uma maior duração do trabalho de parto. Além de formar e capacitar profissionais e gerar conhecimento em um assunto de interesse público, espera-se que este estudo promova e contribua para o desenvolvimento de novos serviços e tecnologias de acompanhamento de gestantes, destacando a relevância do ciclo sono-vigília para a saúde materno-infantil.

**Palavras-chaves:** Gravidez. Parto. Parto Humanizado. Parto Natural. Duração do parto. Obstetrícia. Sono. Qualidade do sono. Duração do sono. Actigrafia. Cronobiologia.

## CONTENTS

1	<b>INTRODUCTION</b>	9
2	<b>THE EXPRESSION OF THE SLEEP-WAKE CYCLE THROUGHOUT PREGNANCY</b>	10
3	<b>ASSOCIATIONS BETWEEN THE DURATION AND QUALITY OF SLEEP OF PREGNANT WOMEN IN THE THIRD TRIMESTER WITH THE DURATION OF LABOR</b>	11
4	<b>CONCLUSION</b>	12
	<b>REFERENCES</b>	13
	<b>GLOSSARY</b>	14
	<b>APPENDICES</b>	15
A	<b>APPENDIX A</b>	15

## 1 INTRODUCTION

### ! Important

You are reading the work-in-progress of this thesis.

This chapter is currently a dumping ground for ideas, and I don't recommend reading it.

You are currently viewing the preliminary print version of this master's thesis.

This document follows the collection of articles thesis format. This first chapter serves as an introduction to the thesis subject, providing its justification, aims, and a list of all projects and related activities produced during its development. The subsequent chapters consist of a series of articles connected to the thesis, with the exception of the last one, which encompasses a discussion and final remarks.

All analyses in this document are reproducible and were conducted using the R programming language along with the Quarto publishing system. It's worth noting that this type of thesis is best suited for online viewing. To access the digital version and see the latest research updates, please visit <https://aliciarvilefortsales.github.io/mastersthesis/>.

Given its preliminary nature, not all chapters are ready for reading. However, the author has chosen to display the entire state of the thesis rather than presenting only polished sections. This approach provides readers with a more comprehensive understanding of the work in progress. Chapters not suitable for reading will include a call block indicating their status.

## 2 THE EXPRESSION OF THE SLEEP-WAKE CYCLE THROUGHOUT PREGNANCY

### ! Important

You are reading the work-in-progress of this thesis.

This chapter is currently a dumping ground for ideas, and I don't recommend reading it.

### i Target journal

1. Chronobiology International (IF 2022: 2.8/JCR | A1/2017-2020).
2. Journal of Biological Rhythms (IF 2022: 3.5/JCR | A2/2017-2020).

### i Note

The following study was performed by Alícia Rafaelly Vilefort Sales (**ARVS**), Daniel Vartanian (**DV**), Maria Augusta Medeiros de Andrade (**MAMA**), Mario Pedrazzoli (**MP**) and Christiane Borges do Nascimento Chofakian (**CBNC**).

**ARVS**, **DV** and **MAMA** contributed to the study's design. **ARVS** implemented the study, performed the statistical analysis, and authored the manuscript. **CBNC** and **MP** served as scientific advisors. All authors participated in discussions about the results and contributed to the final manuscript revision.

*Future reference:* Sales, A. R. V., Vartanian, D., Andrade, M. A. M., Pedrazzoli, M., & Chofakian, C. B. N. (2024). The expression of the sleep-wake cycle throughout pregnancy: a systematic and quantitative literature review. *Chronobiology International*.

### 3 ASSOCIATIONS BETWEEN THE DURATION AND QUALITY OF SLEEP OF PREGNANT WOMEN IN THE THIRD TRIMESTER WITH THE DURATION OF LABOR

#### ! Important

You are reading the work-in-progress of this thesis.

This chapter is currently a dumping ground for ideas, and I don't recommend reading it.

#### i Target Journal

1. Chronobiology International (IF 2022: 2.8/JCR | A1/2017-2020).
2. Journal of Biological Rhythms (IF 2022: 3.5/JCR | A2/2017-2020).

#### i Note

The following study was performed by Alícia Rafaelly Vilefort Sales (**ARVS**), Daniel Vartanian (**DV**), Maria Augusta Medeiros de Andrade (**MAMA**), Mario Pedrazzoli (**MP**) and Christiane Borges do Nascimento Chofakian (**CBNC**).

**ARVS**, **DV** and **MAMA** contributed to the study's design. **ARVS** implemented the study, performed the statistical analysis, and authored the manuscript. **CBNC** and **MP** served as scientific advisors. All authors participated in discussions about the results and contributed to the final manuscript revision.

*Future reference:* Sales, A. R. V., Vartanian, D., Andrade, M. A. M., Pedrazzoli, M., & Chofakian, C. B. N. (2024). Associations between the duration and quality of sleep of pregnant women in the third trimester with the duration of labor. *Chronobiology International*.

#### 4 CONCLUSION

! Important

You are reading the work-in-progress of this thesis.

This chapter is currently a dumping ground for ideas, and I don't recommend reading it.

## REFERENCES\*

- Aschoff, J. (Ed.). (1965). *Circadian clocks*. North Holland.
- Latinitium. (n.d.). *Latin dictionaries*. Latinitium. Retrieved September 21, 2023, from <https://latinitium.com/latin-dictionaries/>
- Marques, M. D., & Oda, G. (2012). Glossário. *Revista da Biologia*, 9(3). Retrieved September 21, 2023, from <https://www.revistas.usp.br/revbiologia/article/view/114816>
- Pittendrigh, C. S. (1960). Circadian rhythms and the circadian organization of living systems. *Cold Spring Harbor Symposia on Quantitative Biology*, 25, 159–184. <https://doi.org/10.1101/SQB.1960.02.5.01.015>

---

\*In accordance with the American Psychological Association (APA) Style, 7th edition.

## GLOSSARY

For an extensive list of chronobiology related terms and definitions, please refer to Aschoff (1965) and Marques and Oda (2012).

### **Circadian rhythm**

A rhythm with a period close to a day/24h, an approximation to the period of the earth's rotation (Pittendrigh, 1960). From the Latin *circā*, around, and *dīes*, day (Latinitium, n.d.). Example: the sleep-wake cycle.

## APPENDICES

### APPENDIX A – APPENDIX A

#### ! Important

You are reading the work-in-progress of this thesis.

This chapter is currently a dumping ground for ideas, and I don't recommend reading it.