# “CAROL DAVILA” UNIVERSITY OF MEDICINE AND PHARMACY, BUCHAREST

# DOCTORAL SCHOOL

# GENERAL MEDICINE

MANAGEMENT OF LOMBAR PAIN IN PREGNANCY AND CONFINEMENT – REHABILATION PROTOCOL

SUMMARY OF THE DOCTORAL THESIS

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## Introduction

Low back pain is one of the main symptoms that occur during pregnancy, affecting up to 70% of all pregnant women. Pregnancy itself is a contributing factor to low back pain. Due to the changes that occur in the body of a pregnant woman, the body's center of gravity shifts forward, hypermobility occurs in the joints, and together with risk factors (history of low back pain, advanced maternal age, high body mass index, multiparity, sedentary lifestyle) the risk of pregnancy-associated low back pain increases, leading to decreased quality of life for the pregnant woman and increased risk of antepartum and postpartum depression.

## Current State of Knowledge

It is well known that throughout pregnancy, maternal physiology undergoes adaptive changes to allow for optimal embryonic and fetal development. In addition to physiological components, there are also changes related to the anatomical features of the pregnant woman, resulting in a series of loco-regional modifications in the osteo-articular system influenced by hormones synthesized at the placental level, as well as by biomechanical factors. [1]

On the other hand, a frequent increase in blood flow in the bone marrow has been observed, with certain pregnant women showing a slight degree of decalcification explained both by the increased serum levels of parathyroid hormone, which is considered an antagonist of vitamin D, and by the increased demands of the continuously developing fetus. [1]

These changes may lead to alterations in the curvature of the spine, balance maintenance, and gait patterns through a targeted effect on key areas of the human body, thus having a significant impact on quality of life by amplifying low back pain and increasing the risk of balance loss, i.e., falling, which may occur as a secondary consequence. These effects are considered to be rather the final results of the cumulative hormonal and biomechanical changes that occur during pregnancy. [1]

Low back pain is a common symptom encountered in pregnant patients and significantly influences their quality of life. Low back pain has been known since ancient times, illustrated by Hippocrates, Vesalius, Pinean, Hunter, Velpeau, and many others. Approximately 50% of pregnant women will experience low back pain at some point during pregnancy or in the postpartum period. This symptomatology has multiple etiological factors: mechanical, hormonal, etc. [2,3,4,5,6]

The low back pain during pregnancy is similar to that of non-pregnant patients and is described at the level of the lumbar spine, above the sacrum. It may radiate to the lower limb, and the contraction of the paravertebral muscles is frequently encountered. The Pregnancy Mobility Index (PMI) developed by Van de Pol et al. aims to estimate the patient's ability to perform ordinary household activities. It is a questionnaire with three scales and can assess the mobility and quality of life of pregnant women with low back pain. Another frequently used scale is the Quebec Back Pain Disability Scale.

Numerous studies address the topic of low back pain in pregnant patients, with prevalence rates ranging from 25% to 90% among patients (averaging 50%). One-third of these will experience severe pain that significantly affects quality of life. The majority of these patients are primiparous [7], being more frequently affected between the 20th and 28th weeks of gestation, and it may persist for up to 3 months postpartum (12.5% of cases may be affected for 12 months).[8]

The pathophysiology of this condition is not fully elucidated, and the scientific basis for the formulated hypotheses is far from being established.

- **Mechanical Factors**

One of the most commonly suggested mechanisms is associated with mechanical factors due to weight gain during pregnancy, the increased abdominal sagittal diameter, the center of gravity of the patient being located anteriorly, and increased stress at the lumbar level. [9,10,11]

A significant consequence of the mechanical changes associated with pregnancy is the appearance of vertebral compressions, dehydration of intervertebral discs, and spinal cord compression. A biomechanical process is also described, suggesting the existence of an accommodation to the new posture through the stretching of abdominal muscles, causing muscle fatigue and additional stress on the spine.

- **Hormonal Factors**

A significant percentage of patients experience low back pain as early as the first trimester of pregnancy. In these cases, no associated diseases or trauma that could initiate the pain can be identified, and mechanical factors are not yet present; hence, some authors attribute

the diagnosis of low back pain to hormonal changes. Relaxin increases ten times during pregnancy, causing ligamentous laxity and discomfort, not only at the sacroiliac joint but also throughout the back, leading to pelvic instability and spinal deformation. Numerous studies regarding the relationship between relaxin and low back pain during pregnancy are ongoing, and a significant correlation has not yet been established. [12]

- **Circulatory Factors**

Another theory suggests that low back pain occurring in pregnancy, with nocturnal exacerbation, may be a consequence of uterine expansion, compression of the inferior vena cava, and venous congestion at the pelvic level and in the spine. [9]

The most common risk factors associated with low back pain in pregnancy described in the literature are pelvic trauma history, chronic low back pain, low back pain associated with previous pregnancies, and high body mass index. [9] An 85% percentage of patients who experienced low back pain in previous pregnancies will develop the same symptomatology in the current pregnancy. [13,14] Additionally, multiparity has been associated with an increased frequency of low back pain in pregnant women. The presence of this symptomatology before pregnancy increases the risk of its occurrence during pregnancy. [15] Pain associated with menstruation is another implicated risk factor.[7]

| **Risk Factors** |
|---|
| History of hypotension |
| Recurrent miscarriages |
| Smoking |
| Pain during previous pregnancies |
| Multiparity |
| History of hypermobility |
| Periods of amenorrhea |
| Intense physical effort |
| High BM |
| Sedentary lifestyle |
| Exaggerated pain interpretation |

**Tabel 2.1** Risk factors involved in pregnancy related low back pain (page 21)

Sustained physical exercises plays a protective role, and socio-economic status does not seem to be involved in the occurrence of low back pain in pregnant women. [16,17] A study using the Roland questionnaire suggested that male fetuses may be a predictive factor for low back pain during pregnancy.[18]

The prevention of low back pain in pregnant women is challenging, making it very important to inform pregnant women, especially those at high risk, and educate them to maintain correct posture during common daily activities to reduce stress on the lumbar spine and the risk of deformity. This can be easily achieved and enhanced by practicing aerobics or physiotherapy exercises, preferably before pregnancy.

It is also crucial for patients to learn how to lift weights correctly, use appropriate chairs, a suitable sleeping mattress, and correct techniques for sitting down and getting up from bed, thereby protecting the spine. [19]

The aim of the study was to discover the incidence of low back pain in the pregnant population and its impact on patients' quality of life. The study tried to identify the risk factors predisposing to the occurrence of low back pain in the pregnant population, and techniques for recovery that can be used by pregnant women, bringing about the best progression of symptomatology in the analyzed group of patients, thus establishing the creation of a therapeutic protocol dedicated to low back pain associated with pregnancy.

The present study examined the pregnant population over a 12-week period, monitoring age, height, weight, body mass index, weight gain during the study, total weight gain during pregnancy, gestational age at which the pain started, history of low back pain, parity, conception method, and results on pain scores using the Roland-Morris and Oswestry questionnaires, as well as utilized recovery techniques.

Most pregnant women consider low back pain to be inevitable during pregnancy, with only about half of those suffering from low back pain seeking medical assistance for relief, especially those who quantify their pain on a higher scale of the VAS (visual analog scale). The majority of women treated for this condition were recommended multiple types of treatment. [20].

Early identification and treatment, considering that each case presents certain particulars, can lead to therapeutic success. Low back pain has a favorable functional

prognosis, and the majority of women recover in the early postpartum months. Conservative management of low back pain is the first-line approach. A correct diagnosis, including differential diagnosis between low back pain and pelvic pain, is vital since the management of these two types of pain differs. [4,5,9,20]

Regarding treatment types used, the prophylaxis of pain during pregnancy appears to be the most important method, as the delayed onset of treatment is often followed by therapeutic failure. It is preferable to adopt conservative management of low back pain during pregnancy, even though these methods do not have a very high success rate.

Treatment options include physiotherapy, yoga, acupuncture, chiropractic treatment, elastic belts, transcutaneous electrical nerve stimulation, pharmacological treatment, corticosteroid injections in the epidural space, intradermal injections of sterile water, or even surgical treatment in severe cases accompanied by pathology in the lumbar spine. Additionally, weight loss during the postpartum period and prevention of weight gain are part of the prophylaxis of low back pain in pregnant women and can decrease the intensity of pain if symptomatology has already developed.[20]

**Hypothesis and Objectives**

The clinical study was conducted between February 2022 – November 2023 at Elias University Emergency Hospital in the Obstetrics Gynecology and Neonatology Clinic, and the Physical Medicine and Rehabilitation (Medical Recovery) ward. The purpose of this study was to discover the incidence of low back pain in the pregnant population and its influence on patients' quality of life. The study aimed to identify the risk factors that predisposed to the occurrence of low back pain in the pregnant population, and associated with it, as well as to identify recovery techniques that can be used by pregnant women and which provided the best symptomatology evolution in the analyzed group of patients. The final objective is to develop a management protocol for low back pain in pregnant patients to improve their quality of life.

**Methodology**

The patients included in the database represent pregnant women evaluated obstetrically in the Obstetrics Gynecology and Neonatology Clinic at Elias University Emergency Hospital who were diagnosed with low back pain associated with pregnancy and referred to the Physical Medicine and Rehabilitation ward for examination and establishment of the therapeutic

approach. The study group consisted of 353 pregnant women who presented for obstetric control in the Obstetrics Gynecology and Neonatology Clinic, where specific symptomatology of low back pain associated with pregnancy was presented, and were redirected to the Physical Medicine and Recovery ward for accurate diagnosis and development of a recovery plan to improve the symptomatology experienced and quality of life.

The first group of patients comprised 196 pregnant women associating low back pain, confirmed later in the department, who agreed to follow the recovery protocol and techniques included in the study, designated as the main group. The entire evolution of evaluated parameters was recorded through biomechanical measurements and low back pain and quality of life assessment questionnaires.

The second patient group consisted of 157 pregnant women associating low back pain, confirmed diagnostically in the department, who did not wish to follow a recovery protocol, representing the control group, evaluated during pregnancy using low back pain and quality of life questionnaires.

Patients included in the study were reffered to the Physical Medicine and Rehabilitation Section, where they were examined using questionnaires and relevant apparatus, following a recovery program per recommendations. The initial evaluation was conducted at the study's entry (23-24 weeks of gestation) and the final evaluation after completing the 12-week protocol (35-36 weeks of gestation) for group one, whereas evaluations for those who did not follow a recovery protocol were done at the same time interval and gestational age, only assessing pain through questionnaires.

**Apparatus and Scales Used in the Study:**

- Tecnobody Walker View Gait Analysis 3.4.2.0
- Roland-Morris Questionnaire for Low Back Pain Disability Assessment
- Oswestry Disability Questionnaire for Low Back Pain

For the evaluated patient group, the following variables were included in the database:

- Age
- Method of conception of the pregnancy
- Height

- Weight
- BMI
- Weight gain during pregnancy
- Parity
- Score on the Roland Morris questionnaire at the study's entry and at the end of the protocol
- Score on the Oswestry questionnaire at the study's entry and at the end of the protocol
- Type of delivery
- History of low back pain
- Number of techniques used

**Therapeutic Methods Used in the Study:**

- Physical exercises:
    - Stretching exercises for neck extensors and scalene muscles, internal shoulder rotators, lumbar extensors, hip adductors and hamstrings, foot flexors;
    - Abdominal muscle toning exercises;
    - Pelvic muscle training;
    - Exercises for increasing strength, endurance, and joint mobility;
    - Relaxation exercises, stabilization, and breathing exercises
- Massage
- Yoga
- Progressive muscle relaxation
- Techniques for maintaining correct posture
- Acupuncture

**Clinical Study**

In the two study groups, a total of 353 patients were identified, of which 218 representing 61.76% had an age greater than 35 years at the study's entry, while 135 patients represented 38.24%. Following the statistical analysis of the two samples, a statistically significant difference was obtained between the scores recorded on the Roland-Morris and Oswestry pain questionnaires. The mean results for the RMQ score for patients over 35 years

of age were 9.0222, while for patients under 35 years of age was 7.3853, with a difference of 1.6369 generating a $p<0.001$, highly statistically significant.

In the Oswestry score, the group of patients over 35 years of age recorded a mean score of 13.644, while the group of patients under 35 years of age recorded a mean score of 10.459, with a difference of 3.185 generating a $p<0.001$, highly significant statistically. In the group of patients who followed the 12-week therapeutic protocol, the patients from the subgroup over 35 years old obtained a mean score of 6.1023 on the RMQ score and 13.191 on the Oswestry score, while patients under 35 years old obtained a mean score of 4.4259 on the RMQ test and 10.70 on the Oswestry test, with a significant statistical difference.

The statistical results recorded during the study confirm the relationship between advanced maternal age and the occurrence of low back pain, as well as its increased intensity compared to patients under 35 years of age.

Within the study conducted, of the 353 examined patients, 214 of them (60.62%) were multiparous, while 139 patients (39.38%) were primiparous. The secundiparous patients (157 cases representing 44.8%) had an average score of 8.04 on the Roland Morris questionnaire, the tertiparous patients (49 cases representing 13.88%) had an average score of 8.61 on the Roland Morris questionnaire, while patients in their 4th pregnancy (8 cases representing 2.27%) had an average Roland Morris pain score of 8.5, whereas primiparous patients (139 cases representing 39.38%) had an average score of 7.73, resulting in a $p=0.034$, statistically significant. Thus, it is noted through the Roland Morris questionnaire that multiparous patients were more predisposed to higher pain scores as the level of parity increased.

Within the group of patients who followed the therapeutic protocol, primiparous patients (75 cases) had an average score of 11.253, while multiparous patients (121 cases) had an average score of 12.628, with a difference of 1.375, generating a $p=0.049$, significant statistically.

At the time T0 of enrollment in the study, the group of 353 patients had an average BMI value of 27.18 kg/m², while at the time T1 of follow-up and study exit, the group of 353 patients had an average BMI value of 28.47 kg/m².

| IMC T0 Grup T | Număr paciente | Procent | Scor mediu RMQ T0 Grup T | Scor mediu Oswestry T0 grup T |
|---|---|---|---|---|
| Normoponderal | 64 | 32.65% | 6.76 | 9.12 |
| Supraponderal | 81 | 41.33% | 8.35 | 12.18 |
| Obezitate gr. I | 46 | 23.47% | 10.17 | 15.60 |
| Obezitate gr. II | 5 | 2.55% | 10.40 | 16.60 |
| **IMC T1 Grup T** | **Număr paciente** | **Procent** | **Scor mediu RMQ T0 Grup T** | **Scor mediu Oswestry T0 grup T** |
| Normoponderal | 46 | 23.59% | 4.00 | 5.36 |
| Supraponderal | 73 | 37.44% | 4.80 | 6.73 |
| Obezitate gr. I | 64 | 32.82% | 6.21 | 9.28 |
| Obezitate gr. II | 12 | 6.15% | 6.30 | 8.83 |
| Obezitate gr. III | 1 | 0.51% | 12.00 | 19.00 |

**Tabel 7.1.** Distribution of back pain assessment scores in pregnant women in the therapeutic group according to the BMI class of the patients (page 91)

Although in the case of low back pain, weight loss or maintaining the same weight is often recommended, this was not possible in the case of the study due to physiological changes of pregnancy, with normal weight gain through the growth and development of the fetus and fetal appendages. Thus, out of the 353 study participants, 349 recorded weight gain over the 12 weeks of participation in the study (with an average of 3.771 kg, a minimum of 1 kilogram, and a maximum of 8 kilograms, with the majority of patients, 115, recording a weight gain of 4 kilograms during the study), 2 patients recorded the same weight, and 2 patients lost 1 kilogram.

Patients in the therapeutic group classified as normoponderal at the beginning of the study had an average RMQ score of 6.76 and 9.12 on the Oswestry questionnaire. After 12 weeks, patients in the normoponderal class had an average RMQ score of 4.00 and 5.36 on the Oswestry questionnaire, with a difference of 2.26 on the RMQ score and 3.76 on the Oswestry score. Patients classified as overweight had an average RMQ score of 8.35 and 12.18 on the Oswestry questionnaire, while after 12 weeks, patients classified as overweight had an average

RMQ score of 4.80 and 6.73 on the Oswestry questionnaire, with a difference of 3.55 on the RMQ score and 5.45 on the Oswestry score. Patients classified in the obesity class I had an average RMQ score of 10.17 and 15.60 on the Oswestry questionnaire, subsequently obtaining an average RMQ score of 6.21 and 9.28 on the Oswestry questionnaire, with a difference of 3.96 on the RMQ score and 6.32 on the Oswestry score. Patients classified in the obesity class II recorded an average RMQ score of 10.40 and 16.60 on the Oswestry questionnaire. At the end of the study, patients classified in the obesity class II had an average RMQ score of 6.30 and 8.83 on the Oswestry questionnaire, with a difference of 4.10 on the RMQ score and 7.77 on the Oswestry score. Subsequent statistical analysis of the present data, using the ANOVA test, yielded a $p=0.015<0.05$, statistically significant, for scores obtained from Roland Morris and Oswestry low back pain questionnaires across all body mass categories (normoponderal, overweight, obesity grade I, and obesity grade II).

At the time of enrollment in the study, patients in the therapeutic group (196 patients) had an average Roland-Morris score of 8.3163, whereas after following the 12 weeks of therapy, the average Roland-Morris score was 5.1786, generating a $p<0.001$, highly statistically significant. In the group that did not follow the therapeutic protocol, the 157 patients were evaluated using the Roland Morris pain questionnaire, initially obtaining an average score of 7.6306, whereas after 12 weeks of follow-up, they obtained an average of 7.8404 with a statistical analysis yielding a $p=0.353$, not statistically significant.

By interpreting the scores of the Roland Morris questionnaire, 188 out of the total 196 patients exhibited improvement in pregnancy-associated low back pain, with 6 patients showing no improvement and 2 patients experiencing a worsened score. Among the patients who recorded improvements in symptomatology, 31 had slight improvement, 71 had moderate improvement, and 86 had significant improvement. In the case of the group that did not follow the proposed therapeutic protocol, 66 of the 157 patients experienced worsening symptomatology, 42 patients showed no improvements, 45 experienced slight improvements, and 4 recorded moderate improvements.

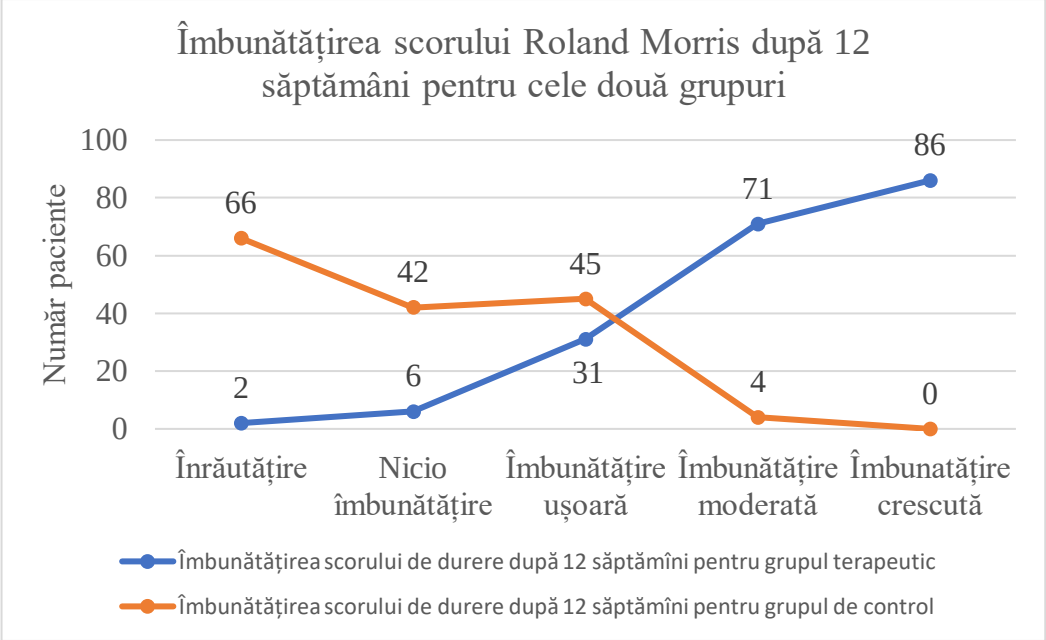


**Figure 6.58.** Improvement in Roland Morris score after 12 weeks for the two groups (page 102)

Patients from the group that followed the therapeutic protocol were evaluated at the study's entry using the Oswestry pain questionnaire. After completing the 12-week therapeutic protocol, these patients were reevaluated using the same score. Through statistical analysis using the Student's T-test, a $p<0.001$ was obtained, indicating a high statistical significance concerning improvements in pain scores following the therapeutic protocol.

At study entry, patients from the therapeutic group (196 patients) had an average Oswestry score of 12.102, and at the final reevaluation after 12 weeks, the average obtained was 7.4388, representing a significant difference of 6.2286 from a statistical perspective.

In the group that did not follow the therapeutic protocol, this group was also evaluated using the Oswestry pain questionnaire. Thus, the 157 patients in the group obtained a mean entry score of 11.146, which after 12 weeks of follow-up rose to 11.446, with a difference of 0.300, resulting in a $p=0.521$, not statistically significant.

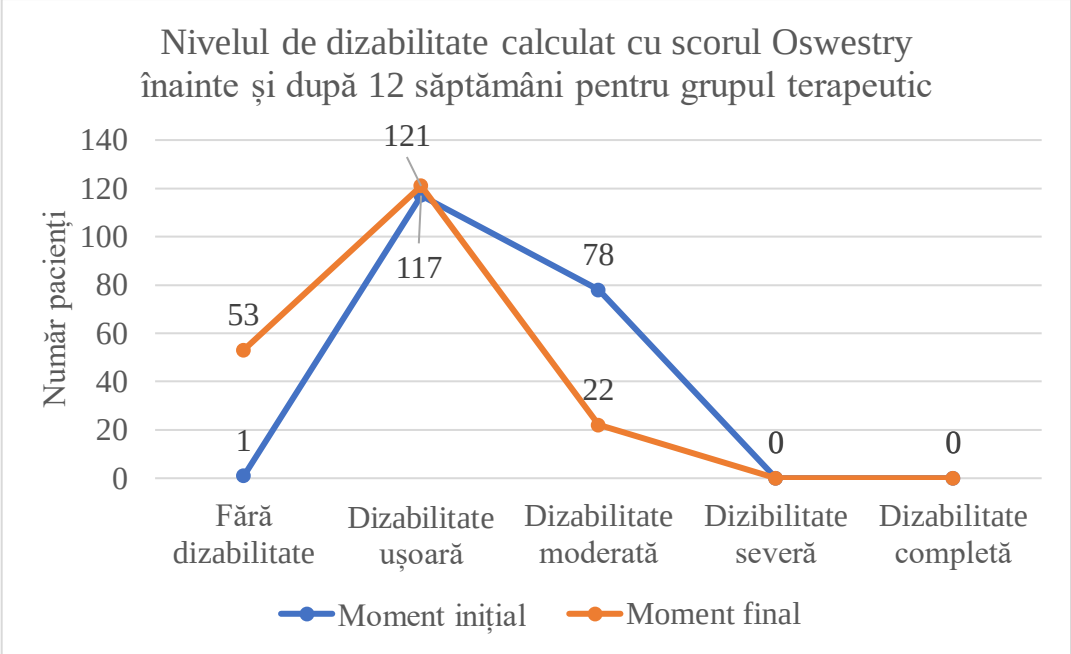


**Figure 6.60.** Disability level calculated with Oswestry score before and after 12 weeks for treatment group (page 106)

By interpretation of the Oswestry questionnaire scores, an improvement in pregnancy-related low back pain was observed in 190 of 196 patients, with 5 patients experiencing no improvement and 1 patient experiencing a worsening of the score. By calculating the level of disability of the Oswestry pain score, at the time of enrollment in the study, 1 patient falls outside the range of disability caused by pain (score 0-4), 117 in the class of mild disability (score 5-14) caused by pain and 78 in the moderate class (15-24). Following the therapeutic protocol produced, upon re-evaluation at the end of it, 53 patients are outside the disability class, 121 are in the mild disability class and 22 in the moderate disability class.

**Conclusions**

National obstetrics and gynecology guidelines, as well as those for physical medicine and rehabilitation, are deficient regarding indications for recovery therapy during pregnancy, as pregnancy-associated low back pain is often overlooked or classified as part of a "normal" experience, leading to decreased quality of life for the pregnant woman, reluctance to attempt natural childbirth due to fear of pain, and increased risk for antepartum and postpartum depression.

The goal of the study was to discover the incidence of low back pain in pregnancy and its influence on the quality of life among patients. The study sought to identify risk factors that predispose to the development of low back pain in the pregnant population and to associate them with recovery techniques that could be utilized by pregnant women and which yielded the best symptomatology evolution in the analyzed group of patients.

By identifying the group of patients at risk for developing pregnancy-associated low back pain (advanced maternal age, elevated body mass index, multiparity, pregnancies achieved through in vitro fertilization, with a history of low back pain in previous pregnancies, hypermobility, and a sedentary lifestyle), these patients can be counseled in advance and guided toward enrollment in a therapeutic protocol.

In this work, I aimed to outline the benefits and advantages that a simple, easy-to-execute protocol, implementable by practitioners in all clinics in Romania, as well as by patients in the comfort of their own homes, has on the quality of life during pregnancy, improving pain tolerance, muscle tone in the pelvic, abdominal, and spinal regions, as well as better control over the emotions generated by pain.

By performing stretching exercises, toning exercises, pelvic muscle training, exercises to increase strength, endurance, and joint mobility, relaxation exercises, stabilization, and breathing exercises, massage, and techniques for maintaining correct posture, these desired effects can be achieved.

The objective of the study was to create a management protocol for low back pain in pregnant patients to improve their quality of life. In this context, I believe this objective was achieved, as the work presented and the study conducted can serve as a cornerstone and a starting point for the correct approach to pregnancy-related low back pain, to be exhaustively studied in the future, with the development of an effective management plan and standardized, adapted, and personalized clinical guidelines, primarily serving to enhance the quality of life for pregnant women and the support they deserve during the most important phase of life: pregnancy.

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1. **Iulia Filipescu**, Mihai Berteanu, George Alexandru Filipescu, Radu Vlădăreanu, 2018. Dorsalgia joasă la gravide şi lăuze. Principii de reabilitare medicală. Editorial Group: MEDICHUB MEDIA. DOI: 10.26416/Gine.19.1.2018.1512

https://www.revistaginecologia.ro/index.php/arhiv/238

2. **Iulia Filipescu**, Dragoș Tudorache, Radu Vlădăreanu, 2024. Pregnancy-related low back pain – the benefits and results of rehabilitation medicine techniques. Editorial Group: MEDICHUB MEDIA. DOI: 10.26416/Gine.44.2.2024.9667

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