

The Influence of Psychophysical Preparation of Pregnant Women on the Outcome of Childbirth and Postpartum Recovery

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ABSTRACT

The psychophysical preparation program for pregnant women includes physical exercises and theoretical lectures aimed at preparing the pregnant woman for childbirth and that the benefits far outweigh the risks. Exercise is an essential element of pregnancy, and OB-GYNs and other obstetric care providers should encourage their patients to continue or begin exercise. The aim of this work is to understand the impact of psychophysical preparation of pregnant women on health during and after pregnancy, birth outcomes and postpartum recovery. Twenty scientific research papers/articles including 5517 respondents were reviewed, based on databases: Web of Science, EBSCO, Scopus, Medline, PubMed, ScienceDirect, Google Scholar, and others. Works published from 2017-2022 were reviewed. The results of this study show that pregnant women who attended the program of psychophysical preparation for childbirth had a chance to experience childbirth in a more beautiful light, to be prepared, so that they would go to the maternity hospital with less fear, how to use breathing techniques during childbirth, and how to have the easiest and most beautiful childbirth without the use of drugs and interventions. Pregnant women had significantly more positive outcomes of childbirth as well as postpartum recovery and mental health. Psychological support and education have positive outcomes on the mental health of pregnant women because they reduce fear of the unknown and reduce the risk of postpartum depression. Higher rates of intact perineum, reduction of episiotomy and less damage of perineal tears are recorded. The preparation itself significantly affects the outcome of the test subjects' births, where vaginal births are much more common, and the rate of instrumental methods of birth and caesarean section is reduced. A positive outcome was recorded during postpartum recovery.

Keywords: Childbirth, postpartum recovery, pregnancy, psychophysical preparation.

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I. INTRODUCTION

Pregnancy (lat. graviditas, gestatio) is a changed physical and psychological state of a woman's organism that begins with the joining of male and female gametes and culminates in childbirth [1]. Pregnancy lasts 280 days, 40 weeks, 9 calendar or 10 lunar months, counting from the first day of the last menstrual cycle. Pregnancy is divided into three stages called trimesters. To estimate the gestational age, it is necessary to know the safe and accurate first day of the last menstruation and to do an ultrasound. Anatomical and physiological changes that occur in a woman during

pregnancy affect practically all organ systems. Hormones play an important role in these changes. For a short time, at the moment of conception, the tissue of the fertilized egg (the so-called trophoblast) prevents the continuation of the menstrual cycle through hormonal action and thus protects the pregnancy. The placenta develops from the trophoblast, which, during pregnancy, develops strong hormonal activity.

During pregnancy, the total amount of blood increases as well as the uterus's need for blood, the blood pressure in the pulmonary vessels increases, and thus the load on the circulation in the lungs. There is a change in breathing conditions and the supply of oxygen to the body, a greater

load on the liver and kidneys, and tissue changes. Under the influence of hormones, the connective tissue becomes softer and more elastic, which represents a positive change because it allows the body to adapt to the demands of pregnancy. The psychophysical preparation of a pregnant woman is an extremely important prenatal activity. It belongs to the modern understanding of the need for a woman in labor to learn breathing techniques during childbirth, through physical exercises she prefers proper work of breathing muscles, pelvic muscles, and the like [2]. Breathing exercises, relaxation, exercises for the mobility of the pelvis and spine as well as mental preparation. Pregnant women are also informed about what awaits them in the maternity ward: from reception, through hygienic preparation, to entering the delivery room.

Participants are also informed about the examinations that await them, contractions (how to recognize them and how to overcome them), and why contractions are given full attention during the preparation. There are numerous benefits of the aforementioned psychophysical preparation for both the mother and the fetus. The use of a specialized physical exercise program during pregnancy, i.e. preparation for childbirth is not associated with any risk to the mother or the fetus and can help reduce medical interventions during labor, which in turn will improve the condition of the mother and child and reduce the cost of perinatal care.

A. Theoretical Preparation

An important part of the preparation is the psychological preparation, i.e., the theoretical part, which is attended from the thirtieth week of pregnancy until the birth itself. A pregnant woman learns how childbirth is a natural physiological act, for which all situations should be prepared, and how to behave in certain circumstances as well as in a new environment. In this part, pregnant women primarily learn about their bodies and their functioning. They also learn about the differences between each person and their body and how it reacts differently in different situations. Also, they learn about how each experience is individual and that it is not necessary that childbirth has to be painful, and unpleasant for everyone, and that it should not be perceived as traumatic.

Hormones influence a woman's behavior during childbirth, while on the other hand, they are responsible for all the actions that the child does in preparation for going out into the outside world [4]. This type of birth is safe and healthy because there are no unnecessary interventions that interfere with the physiological process. The medicalization of childbirth has additionally contributed to the fact that women are most often afraid of childbirth, the intensity of pain, and childbirth interventions. Overcoming that fear of childbirth is the biggest task in preparing for childbirth. Learning how the body works, what to expect, and breaking "taboo topics" can positively affect the course of childbirth. With adequate preparation, most pregnant women who have a healthy physiological pregnancy can enable themselves and their child to give birth without the use of drugs and interventions, as well as make the experience of childbirth beautiful. Good communication with the team in charge of the birthing woman affects her better birth experience. Every pregnant woman should express her wishes and expectations in the conversation with the midwife. It would be ideal if the pregnant woman met her midwife at least a few weeks before

giving birth so that they have time to get to know each other, as well as for the midwife to have an insight into the life and wishes of the woman in labor. In this way, it is possible for the woman in labor to feel less fear and helplessness when she gets to know the midwife, the person who will be with her during the birth. What can further reduce the dose of fear is that the pregnant woman has an insight into what the hospital area looks like, what the place where she will give birth looks like, and where she will be placed after giving birth. In this way, the discomfort and fear of unknown space and unknown people are reduced, and thus anxiety is also reduced. When a pregnant woman is familiar with all stages of childbirth, at the moment when it is no longer a stranger, when she looks forward to it, instead of fearing it, it is more likely that it will be a pleasant experience and that she will enjoy the birth of a new life. The success of childbirth in most cases depends on the participation and cooperation of the midwife and the team in the process. A pregnant woman must be aware that in the moments of giving birth, she plays the most important role in life, a role in which she must be aware, actively participate and consciously make decisions in cooperation with her midwife and gynecologist. The support of the family, especially the partner, has a significant impact during pregnancy and childbirth. Just being there will make the woman in labor relaxed, help her to enjoy her birth, and allow her to surrender to the birthing process.

B. Physical Activity

Physical activity, defined as any physical movement caused by the contraction of skeletal muscles at all stages of life, maintains and improves cardiorespiratory fitness, reduces the risk of obesity and related comorbidities, and results in longevity. Women who begin pregnancy with a healthy lifestyle (e.g., exercise, a good diet) should be encouraged to maintain these healthy habits.

Women who do not lead a healthy lifestyle should be encouraged to see the pre-pregnancy period and pregnancy as an opportunity to adopt healthier routines. Exercise, defined as physical activity consisting of planned, structured, and repetitive body movements performed to improve one or more components of physical fitness, is an essential element of a healthy lifestyle, and obstetrician-gynecologists and other obstetric care providers should encourage their patients to continue or begin exercise as an important component of optimal health. The World Health Organization and the American College of Sports Medicine have issued evidence-based recommendations indicating that the beneficial effects of exercise in most adults are indisputable and that the benefits far outweigh the risks [3].

The guidelines advise that women who habitually engaged in the vigorous-intensity aerobic activity or who were physically active before pregnancy can continue these activities during pregnancy and the postpartum period. In addition, women who are pregnant should be under the supervision of an obstetrician-gynecologist or other obstetrician who can monitor the course of pregnancy.

Women who are pregnant can consult with their obstetrician-gynecologist or another obstetric care provider about whether and how to adjust their physical activity during pregnancy and after delivery. Physical inactivity is the fourth leading risk factor for early mortality worldwide. Examples

of exercises that have been extensively studied in pregnancy and are safe and beneficial: walking, stationary bike, aerobic and Kegel exercises, pilates, yoga, dancing, resistance exercises (e.g., using weights, elastic bands, balls), and exercise stretching.

C. *Stretching Exercises, Strengthening the Muscles of the Pelvis and Pelvic Floor [1]*

We lie on our backs, legs bent at the hip and knee, feet on the floor. We raise the hips and pelvis from the base as much as we feel comfortable, tighten the buttocks and abdominal muscles, and the hands remain on the base. Exhale, stay in that position for a few seconds, and return to the starting position.

We lie on our backs, legs bent at the hip and knee, feet on the floor. Stretch one leg up, hold for a few seconds, and return to the starting position. Let's repeat the exercise with the other leg

Lie on your back, legs bent at the hip and knee, feet on the floor. Let's place the foot of the left leg on the knee of the right, and open the knee outside until we feel a slight stretch. Hold in that position for ten seconds and switch legs.

From a lying position, we gently raise our head, shoulders, and arms, and we try to touch our knees. Let's stay in that position for a while and return to the starting position.

We sit on the floor with our legs outstretched and slightly wider than the width of the hips. Raise and stretch your arms to shoulder height. We slightly lean forward as if we want to reach for something. We try to keep our backs straight. Let's hold that position for a short time and return to the starting position.

Same starting position. This time we draw both legs and bend both knees. Light pressure and rocking on both knees.

We kneel on our hands and knees, straighten our spine and inhale and exhale deeply several times. Then we push the chin towards the chest and push the chest part of the spine towards the ceiling, as if we have a hump on the back, hold for a few seconds. Now we lift our head slightly up and push the chest part of the spine down. Hold for a few seconds and return to the starting position.

Kegel exercises – Pull in and tighten the pelvic muscles, as if you want to hold urine. Each time you tighten your pelvic floor muscles, slowly hold for 10 seconds and then relax.

Most pregnant women can exercise. There are few maternal medical conditions in which aerobic exercise is contraindicated. When there are questions regarding the safety of aerobic exercise in pregnancy, consultation with relevant specialists and subspecialists are advised when indicated. In women who have obstetric or medical comorbidities, the exercise regimen should be individualized.

Obstetricians and gynecologists and other obstetric providers should carefully evaluate women with medical or obstetric complications before making recommendations about participation in physical activity during pregnancy.

Intensity is the most difficult component of an exercise regimen that can be prescribed for pregnant women. To achieve health benefits, non-pregnant women are advised to participate in at least moderate-intensity exercise. In the combined CDC-ACSM (Center for Disease Control and Prevention and the American College of Sports Medicine) recommendations for physical activity and health, moderate

exercise is defined as any activity that is equivalent in intensity to brisk walking [26]. There is no reason to change this recommendation for pregnant women without medical or obstetric complications. The recommended intensity of physical activity for the development and maintenance of physical fitness is somewhat higher. ACSM recommends that intensity be 60-90% of maximum heart rate or 50-85% of maximum oxygen uptake or heart rate reserve. The lower end of these ranges (60-70% of maximum heart rate or 50-60% of maximum oxygen uptake) appears to be appropriate for most pregnant women who did not exercise regularly before pregnancy, and the upper end of these ranges should be considered for those who wish to continue to exercise. maintain fitness during pregnancy. The duration of exercise according to ACSM is 150 minutes per week.

During exercise, pregnant women should be on a safe surface, well hydrated, wear loose clothing, and avoid high heat and humidity to protect themselves from heat stress.

D. *Breathing Techniques*

The natural process we call breathing, except that in rare cases we don't even know it, is very important during childbirth. Helps relieve pain and manage stress. The main purpose of breathing is to provide the body with a sufficient amount of oxygen and free it from harmful gases (carbon dioxide) so that gas exchange can take place properly [2].

Oxygen consumption increases during pregnancy for several reasons. To compensate for this consumption without loss, proper breathing is necessary both during pregnancy and childbirth. Purpose of breathing exercises:

Birth control-Any woman with proper breathing techniques will feel safer during childbirth and will avoid uncontrollable heightened fears and panic attacks.

Coordination of breathing and contraction of the uterus.

Breathing exercises encourage proper oxygenation, which in turn promotes the metabolism necessary for the normal growth and development of the fetus.

Provides better relaxation. It is very important to know how to relax during pregnancy and childbirth.

Strengthens the abdominal muscles and the diaphragm.

Improves lung ventilation.

Techniques and types of breathing can be divided according to the first and second childbearing age. We distinguish the following types of breathing:

Deep abdominal breathing: The air is slowly exhaled through the mouth, the hand is placed on the upper part of the stomach, and the breath is performed either through the nose or through the mouth, while the stomach relaxes. During exhalation, it is necessary to pronounce the sound "s" or "g" to prolong the exhalation. When deep abdominal breathing no longer suits the pregnant woman and when contractions occur at decreasing intervals, the type of breathing usually changes [2].

Short, rapid, and shallow breathing: compared to panting and called "dog breathing". The air is slowly exhaled, then inhaled through the nose and followed by a series of short, quick, and shallow exhalations and inhalations. The hand is placed on the chest to monitor its movement. One must not breathe through the stomach, it must be completely excluded in this type of breathing.

Breathing in the transitional phase between the first and second stages of labor: This is the most difficult period for a pregnant woman. Immediately before the printing and tensioning phase, a combined type of breathing should be applied. Regardless of the urge to print that you feel, you should wait until the doctor and midwife allow printing. Labor will become more frequent and it is still necessary to breathe briefly and shallowly during labor, but occasionally interrupt such breathing with a deep exhalation followed by an inhalation of air and again briefly, rapid and shallow breathing.

Breathing in the second stage of labor: When the doctor or midwife finally allows pressure, when labor begins, you should inhale forcefully, with full lungs, lift your head from the surface, press your chin towards your chest, hold the inhaled air, tense your abdominal muscles and press with your muscles while holding your breath in direction as if he wanted to urinate quickly. The air should be held as long as possible and when labor stops or the pregnant woman can no longer hold her breath, a deep exhalation is made. If the labor is still going on, breathe again or rest in anticipation of the next labor. This way of breathing is not recommended during pregnancy.

II. METHOD

Twenty scientific research papers/articles including 5517 respondents were reviewed, based on databases: Web of Science, EBSCO, Scopus, Medline, PubMed, ScienceDirect, Google Scholar, and others. Works published from 2017-2022 were reviewed (Table I). Reference lists from the selected studies were also checked to identify other similar studies. The collected data were evaluated, summarized, and presented in tabular form.

III. RESULTS

This review aims to understand the impact of psychophysical preparation of pregnant women on health during and after pregnancy, the outcomes of childbirth, and postpartum recovery based on the data we received from twenty scientific research articles.

IV. DISCUSSION

This unified analysis of twenty studies including 5267 women and 250 men (partners) totaling 5517 respondents, showed that the psychophysical preparation of pregnant women has a significant role during childbirth and postpartum recovery. Insecurity, excessive sensitivity, and fear of the unknown can overwhelm a pregnant woman and make her feel bad and build negative prejudices about changes during pregnancy and childbirth. In this segment, the psychological preparation that every pregnant woman should go through plays a big role. Based on the processed results of the study, we see a significant mental improvement in women who participated in psychoeducation to reduce the fear of childbirth on the outcome of childbirth and psychological well-being [5]. They are in a more positive psychological state regarding childbirth and have a higher level of self-confidence

and higher self-efficacy values [6]. They are emotionally stronger, so they have a lower level of anxiety [7] than the control group. Women who attended a course with psychoeducational characterization were more focused on the present, while thoughts focused on the past and focusing on the future were significantly reduced [8].

A study that talks about partners who are supporting their women during childbirth suggests that men increasingly want to participate in prenatal and intrapartum events. Therefore, prenatal education for men will be of great importance, all with the aim of potential benefits such as a greater sense of security, and less fear and tension in process of giving birth [10]. In the assessment of needs, it was shown that participation in psychoeducational content significantly reduces the need for additional information, as it is provided in one place by experts. It is known that as many as 85% of women in labor experience some form of emotional instability or the so-called "baby blues". Baby blues is a condition that most often occurs during the first days of the postpartum period, it is emitted by the alternation of different positive and negative emotions, and if it is not recognized and not intervened, it can easily turn into postpartum depression. In the prevention of complications and emotional roller coaster, the support of the partner proved to be the most effective [25].

This support includes expressions of empathy, listening, openness, affection, reassurance, attention, and emotional support. Support from the husband will make mothers feel valued, safe, and comfortable after giving birth with significantly less fear and anxiety. On the other hand, a very important part of preparing pregnant women for childbirth itself is physical preparation, i.e., exercises.

Exercises most often include training to strengthen the pelvic floor muscles, pilates, yoga, aerobic exercises, walking, stretching, and breathing exercises. The study results show significant differences and effects between intervention and control groups. One of them is the improvement of the elasticity of the perineum through perineal massage, i.e., massage of the perineum, which can prevent episiotomy [22] and damage to the soft exit part of the birth canal. In a study published in 2017, the effectiveness of perineal massage during pregnancy on the prevention of perineal trauma during childbirth was discussed [20]. The massage was applied from the 32nd week, daily. One to two fingers were introduced 3-4 cm into the vagina and downward and sideways pressure was applied. Olive oil was used as a lubricant. There was a higher rate of an intact perineum, a reduction of episiotomy by 50%, a lower degree of perineal lacerations, and less pain in the perineum due to which fewer patients required analgesia postnatally in the massage group. Also, the Pilates method gives significant results, such as a lower incidence of lacerations of the perineum [15].

When we talk about the type of delivery, we can see a clear impact of the exercise program during pregnancy on the outcome that occurred in the end. The percentage of cesarean sections, less pain and discomfort during childbirth, and lower back pain in the intervention group are significantly lower [13]. A relatively reduced risk of the same was observed, which is of great clinical importance considering that the cesarean section rate is a public health problem because the procedure is not risk-free and can harm perinatal outcomes.

The duration of active labor as well as the first and second stages was significantly shorter in patients with a higher level of physical activity [13], [16], [17], [19].

Childbirth is a different experience for every woman, therefore recovery after it is individual for each of them. What every woman in labor can do for herself during that period is psychophysical preparation, which includes information about all the new phenomena she encounters and practicing physical activity, which will greatly help in the period of postpartum recovery and contribute to improving the quality of life for the health of the woman [23]. The results of studies clearly show that regular prenatal exercise helps reduce lower back pain and earlier recovery after childbirth [13]. The incidence of urinary incontinence and related problems is significantly reduced after pelvic floor muscle strengthening training [24].

Numerous indicators indicate that physical exercise during pregnancy, with the observance of all precautions, has a potentially positive effect on childbirth and postpartum recovery, and this influence extends to the postpartum period as well.

V. CONCLUSION

Based on the conducted analysis and obtained results, the following conclusions can be drawn:

Previous exercise habits proved to be significant because most of the respondents who performed exercises for pregnant women have exercise habits from the period before pregnancy and for the same reason do not belong to the risk group.

Psychological support and education have positive outcomes for the mental health of pregnant women because they reduce the fear of the unknown and reduce the risk of postpartum depression.

The results of psychophysical preparation are useful mainly for protecting the mother from the risk of increased body weight during pregnancy, which can be the cause of early complications such as cardiometabolic conditions during and after pregnancy, preeclampsia, hypertension and gestational diabetes.

It was found that in the test subjects who carried out the psychophysical preparation program, higher rates of an intact perineum, reduced episiotomy rate, and lower degree of damage and laceration of the perineum were recorded.

Regular implementation of the psychophysical preparation program significantly affects the outcome of the test subjects' childbirth.

In the intervention groups there were significantly more frequent vaginal births, as well as less chance of induction of labor and cesarean section. A reduction in the time average of the duration of childbirth, especially in the first stage of labor, was recorded:

Less pain and discomfort in the perineum and lower back postnatally.

TABLE I: SURVEY OF RESEARCH STUDIES

Source	Design	Place of research	Number of respondents	Aim	Results	Conclusion
[5]	A randomized controlled trial	Iran	40	This study aimed to examine the effectiveness of psychotherapy on fear of childbirth, pregnancy stress, and self-efficacy	Fear of childbirth significantly decreased in the psychotherapy group by 23%. Also, the scores of six subscales significantly decreased in the psychotherapy group including lack of self-efficacy with a large effect size ($B = 7.57$, $P = <0.001$, $\eta^2 = 0.29$), fears with a large effect size ($B = 4.47$, $P = <0.001$, $\eta^2 = 0.22$), negative evaluation with a large effect size ($B = 1.97$, $P = <0.001$, $\eta^2 = 0.15$), lack of positive anticipation with a large effect size ($B = 1.75$, $P = 0.006$, $\eta^2 = 0.11$), concern for the child with a large effect size ($B = 1.37$, $P = 0.008$, $\eta^2 = 0.10$) and loneliness with a large effect size ($B = 5.70$, $P = < 0.001$, $\eta^2 = 0.19$). Regarding anxiety in the group that participated in psychotherapy, an decreased significantly with a medium effect size ($B = -12.42$, $P = <0.001$, $\eta^2 = 0.22$).	Psychotherapy has a significant impact on reducing fear of childbirth, overall stress during pregnancy as well as generalized anxiety.
[6]	A randomized controlled trial	Iran	58	This study was designed to examine the effect of an early education program based on self-help on the self-evaluation of postpartum primiparous women.	The results showed that in the intervention group there was a statistically significant difference in the mean total self-evaluation results before and after the educational program. Thus, the mean total score increased by 18.42. The results of this study revealed that self-evaluation scores in the control group decreased significantly six weeks postpartum.	The early self-help education program was effective, and increased women's self-efficacy, and postpartum adaptation. Therefore, a self-care model is recommended for women with a normal vaginal or caesarean section during the postpartum period. Early education of postpartum women via telephone, and cyberspace communication also appears to be welcome, and it is recommended that midwives provide appropriate educational content to women at home or in health centers.
[7]	A single-blind randomised controlled trial	Taiwan	53	This randomized controlled trial aimed to examine the effectiveness of an 8-week integrated childbirth education program involving pregnant women, and their partners for support focused on fear of childbirth (primary outcome), and anxiety, depressive symptoms, and dispositional awareness (secondary outcomes).	At 36 weeks of pregnancy, mean scores for pregnant women who participated in the intervention of integrated childbirth education were significantly lower for fear of childbirth ($IG = -13.4$, $p < 0.001$; $CG = 0.71$) than for women in the control group. Women in the intervention group reported lower anxiety ($IG = -5.8$; $CG = 0.62$) ($p < 0.001$), lower depression ($IG = -2.0$; $CG = 0.48$) ($p < 0.001$) and greater dispositional attention ($IG = 3.1$; $CG = 0.35$) compared to the control group.	An 8-week integrated childbirth education intervention including mindfulness training reduced levels of fear of childbirth, anxiety, and depression, and increased levels of mindfulness in pregnant women with high fear of childbirth. Significant changes in all outcome measures were detected at 36 weeks of gestation, and were maintained 1 week postpartum, and the greatest change was found in fear of childbirth. Importantly, the intervention included simulation-based childbirth education, and mindfulness training involving both pregnant women, and their support partners, which is the highlight of the program.
[8]	A non-randomized quasi-experimental study	Italy	240	The main objectives are that the planned course would primarily have a beneficial effect on perceived self-efficacy while reducing maternal anxiety, compared to those who attended the traditional course and those who did not attend any prenatal course. Furthermore, in the control group that did not attend the prenatal course, there would be an increase in the need for information, reassurance and exchange, as well as anxiety and a decrease in the perceived level of self-efficacy.	The results obtained from the research showed the effectiveness of the psychoeducational intervention on all nine considered and collected measures before and after the two-month interval, which corresponds to the end of the course with the enrichment of psychoeducational content. While measurements at baseline showed no significant differences between groups, significant effects emerged after the interval on most of the variables targeted by the intervention. Regarding anxiety, threat perception seems to have been well controlled by the provision of two antenatal courses, one with a psychoeducational characterization and a traditional basic one. In contrast, in the control group there was a significant increase in this fear after two months. For state anxiety, the psychoeducational	A comparison (pre-post) with a group of pregnant women who attended a traditional course and with a control group of pregnant women who did not attend any course showed that the psychoeducational intervention stimulated, in the end, a higher level of perceived self-efficacy and a significantly reduced level of anxiety by directing the focus of the participants on functional management of the present.

					intervention showed a clear effectiveness in comparison with the control group and the group that attended education, although the result showed a lower level of anxiety than the control group. Equally relevant were the effects of the psychoeducational intervention on perceived self-efficacy. Participants in the psychoeducational group reported significantly higher self-efficacy values than those in the basic course group and the control group. In a needs assessment, completion of two courses was shown to correspond to a significant decrease in information need, which instead showed a significant increase in the control group. The psychoeducational intervention showed a significant reduction in the need for persuasion, which remained unchanged for the participants of the training, while it showed an increase in the control group.	
[9]	A Randomised Controlled Trial	India	78	This study aimed to evaluate the effect of yoga therapy on maternal stress levels, heart rate variability and obstetric outcomes in prenatal women.	The Stress Perception Scale SPS score decreased by 17% in the yoga group and increased by 8% in the control group after 12 weeks of study. In the middle of the study, even after 6 weeks of intervention, the SPS score dropped significantly in the Yoga group compared to the control group. SPS was 43.5 points lower in the Yoga group compared to the control group at mid-study.	A significant reduction in stress was found after twelve weeks of yoga therapy using both subjective (perceived stress scale) and objective (heart rate variability) parameters. The yoga group had a lower incidence of adverse pregnancy outcomes such as hypertension, premature delivery, fetal growth restriction, etc., although it was not statistically significant.
[10]	Survey	Nigeria	250 men (spousals)	The study aimed to explore male partners' attitudes and experiences of their participation during pregnancy, labor and delivery in a low-resource community.	173 (69.2%) accompanied the partner in the visit to the prenatal clinic, and 150 (60.0%) were present at the ultrasound examination of the fetus. 171 (68.4%) participants supported the presence of a male partner at the birth in order to improve the appreciation of women's values (95; 55.6%) or to encourage women in labor (54; 31.6%). Also, 137 (54.8%) men requested to attend the previous birth and 28 of them expressed their desire to attend the next birth.	In conclusion, this study suggests that men increasingly want to participate in prenatal and intrapartum events. Therefore, prenatal education of men, male-friendly institutional infrastructure and a positive attitude of health workers will contribute positively to the achievement of potential benefits.
[11]	A randomized controlled trial	Spain	594	The main objective of this study was to examine the effects of an exercise program during pregnancy on maternal weight gain and the prevalence of gestational diabetes.	594 pregnant women were assessed for eligibility and 456 were enrolled (EG n = 234; CG n = 222). The results showed a higher percentage of pregnant women who gained excess weight in CG than in EG (30.2% vs. 20.5%). Similarly, the prevalence of gestational diabetes was significantly higher in CG than in EG (6.8% vs. 2.6%).	The results of this trial show that exercise during pregnancy can reduce the risk of excessive maternal weight gain and gestational diabetes.
[12]	Union of two randomized controlled trials	Spain	1348	To determine the effects of gestational exercise on the cardiometabolic health of the mother during pregnancy and on the health of the mother/offspring after postnatal follow-up.	The benefits of gestational exercise on maternal and child health were maximized overall in those who were previously inactive, as they had approximately one-third the risk of gestational hypertension compared to their previously inactive peers who did not do the exercise intervention. Maternal exercise helps maintain a healthy weight after pregnancy in both mother and child, with this effect being particularly strong in those previously inactive women who exercised during pregnancy. Maternal exercise was associated with a lower risk of maternal cardiometabolic conditions other than hypertension or obesity after approximately six years of follow-up, and the benefit was very strong in those who were previously inactive but exercised during pregnancy (~80% lower risk).	In summary, the gestational exercise intervention we used was shown to be safe and beneficial for both mother and child, allowing them to maintain an overall healthier cardiometabolic status. Our findings are relevant in light of the increasing incidence of excessive gestational weight gain, which contributes to the intergenerational transmission of obesity, and they confirm the idea that pregnancy should no longer be considered a state of isolation. In fact, it might represent the optimal time for moderate-intensity exercise.
[13]	A Retrospective study	United Arabic Emirates	200	We hypothesized that women who follow prenatal exercises, including yoga, for at least three months would have better outcomes	The results showed that subjects who followed prenatal exercises, including yoga, had a lower cesarean section rate, lower gain, higher birth weight, less pain and overall discomfort	The results of this retrospective study showed that regular prenatal exercise, including yoga, can help reduce cesarean rates, reduce maternal weight gain,

during labor, weight loss, postpartum recovery, reduced back pain during pregnancy, and overall discomfort during labor.

during labor, lower back pain during pregnancy and earlier after birth. For labor and delivery, 22% of subjects in the exercise group, compared with 49% in the control group, required induction of labor. The caesarean section rate was 37% in the exercise group compared with 95% in the control group. In total, 63% of subjects in the exercise group gave birth vaginally compared to 5% of subjects in the control group. The average duration of labor in the exercise group was 401.05 min, while in the control group it was 607.45 min. Maternal weight gain and infant weight: The average weight gain from 12-14 weeks gestation to 6 weeks postpartum was 11.5 kg in the exercise group, which was significantly lower than 15.1 kg in the control group. The average birth weight of the newborn was significantly higher in the exercise group (3156.6 g) compared to the control (2905.5 g) group. Postpartum recovery: Time to resume housework and return to work (if employed) was significantly shorter in the exercise group (86%) compared to the control (67%) group. Back pain during pregnancy: All subjects included in this study reported experiencing back pain at some point during pregnancy. However, the mean score of their worst pain was significantly lower in the exercise group (6.5 points) compared to the control (8.0 points) group. Pain and overall discomfort during childbirth: The results showed that the labor pain score reported by subjects in the exercise group (7.5 points) was significantly lower than that in the control group (9 points). However, there was no statistically significant difference in the overall discomfort experienced by subjects during labor between the groups.

increase infant weight gain, reducing pain and general discomfort during childbirth, and lower back pain during pregnancy and help in earlier recovery after childbirth. These results suggest that pregnant women should be active throughout pregnancy and follow a supervised exercise program.

[14]	A retrospective study	Tunis	106	Determine the connection between practicing physical activity during pregnancy and preeclampsia.	A positive correlation was found between the duration of gestation and total energy consumption, as well as energy consumption related to any intensity of physical activity with the exception of sedentary activities. It is interesting that a positive correlation was also found between the weight of the newborn and the total energy consumption, as well as the energy consumption related to physical activity of light and moderate intensity, but not to vigorous and sedentary activities. There is a significant association between preeclampsia and total energy consumption during pregnancy for all types and intensities of physical activity.	In short, we found a positive correlation between the total amount of energy consumed during physical activity and the duration of pregnancy, which can be considered an index of maternal and fetal health, especially in the context of preeclampsia. In addition, the study showed an inverse association between the prevalence of preeclampsia and total energy expenditure during pregnancy for all types and intensities of physical activity. Considering the results and the results of others, the proposal is that women should be encouraged to maintain their level of physical activity during pregnancy, and women who were previously sedentary should be encouraged to start regular physical activity, with a gradual increase in intensity as recommended by the American College of Obstetricians and Gynecologists to an adequate level, in order to prevent the development of preeclampsia. The study showed an inverse relationship between the prevalence of preeclampsia and total energy consumption during pregnancy for all types and intensities of physical activity. Considering the results and the results of others, the proposal is that women should be encouraged to maintain their level of physical
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[15]	A Quasi-Experimental Study	Spain	73	The initial hypothesis of this study was that the incidence of perineal wounds during childbirth would be lower among those participating in a specially designed Pilates program. Therefore, this research aimed to evaluate the influence of Pilates during pregnancy on the frequency and degree of intrapartum injuries of the perineum.	The results show a lower incidence of laceration during childbirth (13.3% of the total) among those women who attended Pilates compared to those who attended only regular prenatal classes (86.7%). These results support intervention studies aimed at reducing perineal trauma through training programs, such as those described by León-Larios and Dieb. The first cites a figure of 17.6% for trauma among women who did not follow the program, compared to 6.9% for those who did. In a study, 13, 5% of pregnant women who followed the training suffered trauma, in contrast to 21.5% of those who did not.	Health center managers should promote training of midwives in the prevention and treatment of pelvic floor injuries during pregnancy, and midwives should consider strategies to improve adherence and participation in pelvic floor exercise programs during pregnancy using apps and other digital media specifically designed for this stage.
[16]	Prospective cohort study	United States of America	811	The primary objective of this analysis was a shorter duration of the first and second stages of labor. The secondary goal was a shorter duration of active labor and easier lacerations of the perineum.	A total of 811 patients with complete data in the third trimester were included in this analysis. The mean score of the physical activity survey was 9.5 (8.2–10.8). Of the 811 patients, 203 (25%) had a higher level of physical activity during pregnancy. There was no difference in the duration of the second stage of labor between pregnant women with and without greater physical activity (1.29±2.94 vs. 0.97±2.08 hours; P=15). The duration of active labor was significantly shorter in patients with a higher level of physical activity (5.77±4.97 vs. 7.43±6.29 hours). Patients with higher levels of physical activity were significantly less likely to have a prolonged first stage (9.8% vs. 19.4). However, rates of prolonged second-stage cesarean delivery, operative vaginal deliveries, and perineal tears were similar between the 2 groups.	This secondary analysis of a prospective cohort study found that higher levels of global physical activity during pregnancy were associated with a shorter duration of the active stage of labor and a reduced likelihood of a prolonged first stage, with no difference in the duration of the second stage. What does this add to what is known? The results of this study suggest that physical activity during pregnancy may play a role in improving birth outcomes.
[17]	A randomized clinical trial	Spain	508	This study aimed to examine the effect of a program of supervised physical exercise and moderate exercise during pregnancy on the total duration of labor, as well as on the duration of individual stages of labor.	Exercises have been proven to significantly reduce the total duration, the first stage, as well as the combined duration of the first and second stages of labor without risk to the mother and fetus during pregnancy. Furthermore, the overall health status of the newborn is unchanged, which is reflected in the Apgar score results that are used around the world. Further examination of birth weight found that the percentage of infants with macrosomia was lower in the intervention group (by per-	It was concluded that a supervised physical exercise program started early and continued during pregnancy reduces the duration of the first stage of labor, as well as the total time of the first two stages together, which leads to a reduction in the total time of delivery.

					protocol analysis), which was previously noted adding further evidence that exercise may improve perinatal outcomes by preventing excessive weight gain during fetal development. The results showed a significant decrease in both the total growth and the percentage of pregnant women with excessive weight gain in the intervention group compared to the control group.	
[18]	A Quasi-Experimental Study	Portugal	255	The goal is to promote healthy lifestyles in pregnancy, including regular physical activity and a healthy and balanced diet, which will affect the lower rate of induced labor in the intervention group compared to the control group.	The control group had a higher chance of induced labor compared to women who underwent the intervention. No differences were found between the groups in instrumental vaginal deliveries, the frequency of cesarean sections, the time to the beginning of the active phase, the duration of the active phase and the duration of the second phase of labor. The disadvantage of the study is that the number of intervention and control groups is not matched, so it is possible that the results are not appropriate, the control group was more numerous.	The implementation of a controlled and supervised exercise program during pregnancy was associated with significantly lower odds of induced births.
[19]	A randomized clinical trial	Spain	140	To determine the duration of labor in pregnant women who completed a program of moderate physical exercises in the water and subsequently had a eutocic birth.	The total duration of labor was calculated as the sum of the first, second and third labors, expressed in minutes. Significant differences were observed in this regard. In phases 1 and 2 there was a difference of 2 h 25 min between EG (4 h 20 min) and CG (6 h 45 min). The difference of just over one hour for the second phase was statistically significant. However, there were no statistically significant differences for the third phase, and both groups had similar times. The total delivery time for EG was almost three hours less than for CG. Variables that affected the time of delivery were induced labor, use of epidural/subdural analgesia, administration of oxytocin and performance of physical exercise. The average duration of dilation was 88, 87 min longer in CG than in EG, adjusting for all other variables, and 35.83 min longer until fetal expulsion.	Moderate physical exercise in water is associated with a shortened total time of labor. In the research, the first and second stages of labor were significantly shorter in EG. Moreover, this activity increases the rate of eutocic delivery, which allows the mother to recover more quickly and to establish rapid skin-to-skin contact with the baby.
[20]	A quasi-randomized controlled trial	Spain	400	The aim of this study is to evaluate the effect of a combined program of pelvic floor exercise and perineal massage on the rate of intact perineum in primiparous women from 32 weeks of pregnancy to birth.	The second phase was significantly shorter in the intervention group. However, the total length of labor did not differ significantly between the groups. Perineal trauma: Women who had a caesarean section were removed from this analysis. 193 women in the intervention group and 160 in the control group were analyzed. There was a higher rate of intact perineum in the intervention group (n=34, 17.61% vs. n=11, 6.85%). In the group that was included in the perineal/pelvic floor training program, there was a reduction of episiotomies by 31.63% (n=97, 50.25% vs. n=131, 81.87%). Differences were observed in the proportion of women who did not require suturing of the perineum (intact perineum and first-degree trauma), (44, 31% in the intervention group and 10.27% in the control group). This corresponded to a trauma rate of 44.32% minor grade 2 damage (intact, first degree, vaginal, labial) in the intervention group and 10.27% in the control group. The third-degree tear rate was lower in the intervention group (n=10, 5.18% vs. n=21, 13.12%), as was the fourth-degree tear rate (n=1, 0.52% vs. n=4, 2.5%). If the women referred to pain, it was obtained from the medical records in which the nurses recorded it. Pain was recorded as "yes or no", as was the medication used to relieve it. Women in the intervention group had significantly less perineal pain, with 47 participants (24.35%) reporting pain after birth compared with 58 women in the standard care group	For the women in this study, a combined perineal/pelvic floor training program based on pelvic floor exercises and perineal massage for primiparas appears to increase the likelihood of having an intact perineum, reduce the rate of episiotomy and severe perineal trauma, postpartum perineal pain, and have no effect on perinatal newborn outcomes.

					(36.25%), and fewer women requiring analgesia postnatally. (n=41, 21.24% vs. n=49, 30.62%). There was no difference in other neonatal and maternal outcomes.	
[21]	Observational prospective study	Spain	62	Physical activity performed by pregnant women can have a beneficial effect by reducing the number, percentage, and degree of perineal tears.	According to the analysis of the level of physical activity among pregnant women who experienced perineum tearing, 63.8% (N=30) were not active, while 25% (N=4) were active. Regarding tear grade, type 1 (36.5%) was more common than type 2 (17.5%), and no type 3 or 4 were reported in this study. Within each tear grade subgroup, inactive women suffered a higher percentage of tears of active pregnant women, with 42.6% (N = 20) vs. 28.8% (N = 3) of women having grade 1 and 2 tears, 1.2% (N = 10) vs. 6.2% (N = 1) women who had a type 2 tear.	Physical activity clearly acts as a preventive factor in perineal tears during childbirth.
[22]	A randomized clinical trial	Madrid	98	The main objective of this study was to examine the impact of a virtual structured exercise program during pregnancy on the occurrence and severity of injuries in the perineal region during childbirth.	The results showed a disturbing general trend in perineal injuries, with a high percentage (62%) of perineal tears and 28% of episiotomies. Lower occurrence of pelvic floor tears in IG (73% vs. 52%, respectively) as well as their severity, with grade 2 and 3 tears occurring more often in CG (16% vs. 44% and 0% vs. CG) 4%, respectively) are important findings. Regarding non-instrumental delivery, 83% of women in CG had a perineal tear compared to 54% in IG. On the other hand, among women with instrumental delivery, all women in the control group (N = 8) received an episiotomy, while in the intervention group only two out of four women (50%) received an episiotomy.	This study confirms the beneficial effects of exercise during pregnancy and shows the importance of using lifestyle-oriented treatments as a necessary factor for the prevention of pelvic floor injuries and complications during childbirth and in the postpartum period.
[23]	Randomized clinical trial	Spain	119	This study aimed to determine whether performing a moderate hypopressive exercise program after childbirth improves women's health-related quality of life.	Statistically significant differences ($p < 0.05$) were found in general health components, vitality, emotional role, and mental health in the sample of the group of women who exercised and scored higher. We found statistically significant differences in all aspects between the groups. The interaction between time and group affects general health components, vitality, emotional role, and mental component scores.	A training program with hypopressive physical exercises improves the quality of life after childbirth. According to the recommendations of ACOG, the hypopressive method is valid for improving the quality of life in women who implement this method from the 16th week of pregnancy.
[24]	Randomized controlled trial	Iceland	84	Effects of pelvic floor muscle training on urine and/or anal leakage rates (primary goals); secondary outcomes included related exertion and pelvic floor muscle strength and endurance	Finally, urinary incontinence was less common in the intervention group, with 21 participants (57%) still symptomatic, compared with 31 controls (82%) ($P = 0.03$), as was a bladder problem in 10 participants. (27%) in the intervention versus 23 (60%) in the control group. Pelvic floor muscle training had no effect on anal incontinence, nor was it a bowel-related condition. The intervention group's pelvic floor and anal muscle strength and endurance were preserved.	Six months after birth, postpartum pelvic floor muscle exercise reduced incidence of urine incontinence and associated issues while increasing muscular strength and endurance. Important findings: Individually supervised postpartum pelvic floor muscle exercise dramatically decreased urinary incontinence. There was no effect on anal incontinence.

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