International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

Effectiveness of Structured Antenatal Physiotherapy Module During Third Trimester of Pregnencey in Primigravida Women- Randomised Controlled Trial

Dr. Amrutkuvar S. Rayjade[1],

Ph.D., Krishna College of Physiotherapy, Krishna Vishwa Vidyapeeth, Deemed to be University, Karad.

Dr. Rajkumar P. Patange[2],

Professor & HOD OBG Department, Krishna Vishwa Vidyapeeth, Deemed to be University, Karad.

Dr. Ankita Durgawale[3],

Assistant Professor, Krishna Vishwa Vidyapeeth, Deemed to be University, Karad.

Dr. Vaishali Jagtap[4],

Associate Professor, Krishna Vishwa Vidyapeeth, Deemed to be University, Karad.

Dr. Trupti Yadav[5],

Associate Professor, Krishna Vishwa Vidyapeeth, Deemed to be University, Karad.

Abstract

Pregnancy is a unique and exciting time in a woman's life that highlights her extraordinary ability to create and nurture and connects her to the future. A pregnant lady has an obligation to protect the health of her unborn child. The growing fetus depends only on the health of the mother for all of its needs.Data from the World Health Organization's Global Health Observatory indicate that, in 2015, complications from pregnancy and delivery claimed the lives of about 830 women every day. A woman in a developing country has a roughly 33-fold increased risk of maternal deaths than a woman in a developed country.[3]

Introduction-

Pregnancy is a unique and exciting time in a woman's life that highlights her extraordinary ability to create and nurture and connects her to the future. A pregnant lady has an obligation to protect the health of her unborn child. The growing fetus depends only on the health of the mother for all of its needs.Data from the World Health Organization's Global Health Observatory indicate that, in 2015, complications from pregnancy and delivery claimed the lives of about 830 women every day. A woman in a developing country has a roughly 33-fold increased risk of maternal deaths than a woman in a developed country.[3]

According to UNICEF, every day some 800 women worldwide die from avoidable complications related to pregnancy and delivery, with 20 percent of these deaths taking place in India. It is estimated that pregnancy-related avoidable causes claim the lives of 55,000 Indian women annually.[4]

As an essential component of their right to sexual and reproductive health and as a means of preserving their dignity, women and adolescent girls' survival throughout pregnancy and childbirth are protected by international human rights law.[5] "Every expectant mother and newborn receives high-quality care throughout pregnancy, delivery, and the postnatal period" is the world that the World Health Organization (WHO) envisions.[6] Nevertheless, pregnancy- and childbirth-related problems claimed the lives of an estimated 303,000 women and adolescent girls in 2015.[7] Approximately 99% of maternal deaths take place in areas with inadequate resources, and many of these deaths are avoidable.[3] Comparably, in 2015 there were about 2.6 million stillbirths, mostly in areas with few resources.[8]Crucially, there is proof that almost all maternal

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

problems that pose a risk to life can be prevented or treated at a reasonable cost.[9] Achieving optimal adaptation and implementation of current research findings has the potential to mitigate approximately two-thirds of the worldwide maternal and newborn health burden. Adopting a human rights-centered viewpoint, however, means more than just preventing diseases and deaths; it also entails enhancing health and quality of life while respecting human rights and dignity. [10, 11]

Significant life changes brought about by pregnancy and childbirth might affect a couple's earlier stages of physical and emotional adjustment. Women frequently encounter changes in how they perceive their sexuality during this time. [12] Some women may have myofascial pain in their pelvis, hips, or back during pregnancy. Trigger points, soreness in the muscles, and limitations in movement as a result of anomalies in the muscles and fascia (connective tissue) are the hallmarks of Myofascial Pain and Dysfunction Syndrome (MPDS). Prenatal physical therapy has the potential to mitigate these symptoms and enhance overall comfort levels throughout gestation. [13]Antenatal care (ANC) refers to the medical attention that adolescent girls and pregnant women receive from qualified healthcare providers. Optimizing the health of the mother and the unborn child during pregnancy is its main objective. ANC includes a number of essential components, including risk assessment, sickness prevention and management for illnesses associated to pregnancy or concomitant conditions, and health promotion and education. By identifying and treating pregnancy-related issues directly, ANC helps to lower morbidity and mortality rates among mothers and perinatal patients. It also indirectly helps by identifying women and girls who are more likely to experience difficulties during labor and delivery and making sure they are referred to the right healthcare facilities in a timely manner when necessary.[14]Many physiological and physical changes occur during pregnancy, marking two significant turning points in a woman's life. Expectant mothers require special care because pregnancy has two positive health effects: the mother's own as a respected member of the community and the child she is carrying. The physiological changes that occur during pregnancy happen gradually, but they eventually affect every function in the body. Apart from adjusting to these physiological changes, expectant moms also experience psychological changes that are prompted by the increasing obligations that come with welcoming a completely dependent new member of the family.[15, 16]The physiological changes that accompany pregnancy are a normal reaction to the development of the fetus. Hormonal changes, an increase in blood volume overall, weight gain, and the growing growth of the fetus as pregnancy progresses are some of the causes that cause these changes. Together, these variables have physiological effects on the expectant mother, affecting the immune system, musculoskeletal, endocrine, reproductive, cardiovascular, respiratory, neurological, urinary, and gastrointestinal systems, as well as changing the skin and breasts. [17, 15]Throughout and after pregnancy, leading a healthy lifestyle that includes physical activity can have a number of positive effects on the mother and the unborn child. [18]It is commonly acknowledged that engaging in regular physical activity has favorable effects on both mental and physical health. The World Health Organization (WHO) recommends that people in the age range of 18 to 64 should try to get 150 minutes a week of moderate-intensity exercise or 75 minutes a week of vigorous-intensity exercise.[19, 20]Low levels of physical activity have been found to be the fourth leading cause of death worldwide, with a correlation to diseases such as diabetes mellitus, stroke, and cardiovascular disease. Even with these guidelines, a local poll shows that just 50.7% of men and 37.4% of women have reached the higher level of physical activity that the World Health Organization recommends.[21, 22]In particular, physical exercise has a significant influence on body composition.[23, 24] Pregnancy-related weight gain and gestational diabetes mellitus (GDM) can be prevented with lifestyle changes that incorporate exercise and nutrition. With such measures, there is also a decreased chance of persistent postnatal weight increase.[25, 26]Women who exercise throughout pregnancy may benefit from a number of factors, such as better weight control, improved mood, and maintenance of fitness levels. Frequent exercise throughout pregnancy can also lower the risk of developing pregnancy-related conditions such pre-eclampsia and pregnancy-induced hypertension.[27]Considering the persistent absence of a declining pattern in the prevalence of inadequate physical activity across global populations, it becomes crucial to formulate strategies for effectively imparting knowledge about the significance of physical exercise. This need for education is particularly pronounced among pregnant women.[28, 29]

Pregnant women tend to lead more sedentary lives and become less physically active as they adapt to significant physiological and psychological changes during pregnancy.[30] A study conducted in the United States revealed that during early pregnancy, only 32% of pregnant women met the recommended physical activity guidelines, and this percentage decreased to 12% in late pregnancy.[31] Similarly, research involving Asian participants showed that

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

the total energy expenditure of pregnant women was notably lower during pregnancy compared to before pregnancy.[32] This decline in physical activity levels during pregnancy has been consistently observed in previous studies.[33] Pregnant women were found to spend more than half of their time without engaging in physical activity.[29] When compared to nonpregnant women, a considerably smaller proportion of pregnant women met the recommended physical activity guidelines (15.8% vs. 26.1%).[34] Additionally, pregnant women tended to spend more time engaged in sedentary behavior compared to their nonpregnant counterparts.[35]

These findings collectively indicate a decrease in physical activity levels among pregnant women and suggest the presence of potential barriers that hinder them from engaging in sufficient exercise during pregnancy. Previous research has explored these barriers. Pregnant women often experience various pregnancy-related symptoms, including lumbopelvic pain [36], psychological challenges like anxiety and depression [37], and gestational weight gain [38], all of which can act as barriers to maintaining a higher level of physical activity.[39, 40] Some pregnant women also cited a lack of time due to busy work schedules as a reason for their reduced physical activity. [41] Moreover, misconceptions about the impact of physical activity on fetal health may deter pregnant women from exercising. Many express concerns about potential harm to the fetus. [41, 42] In particular, Chinese pregnant women may view prenatal physical activity as a taboo, fearing that it could lead to harm or miscarriage.[42, 43]

Given the evidence of low physical activity levels among pregnant women and the barriers they face in increasing their physical activity, interventions are needed to raise awareness among pregnant women about the benefits of physical activity for their health and well-being. Pregnancy has been recognized as a period during which women can be effectively motivated to modify their health behaviors, including their physical activity habits. [44]

An increasing amount of research has highlighted the potential risks associated with extended periods of sitting or reclining, known as sedentary behavior. This behavior, which involves low energy expenditure while sitting, lying down, or reclining, has been identified as an independent risk factor for conditions like mortality, diabetes mellitus, and cardiovascular disease. [45-47] In response to these health concerns related to sedentary behavior, the American Heart Association has issued an advisory emphasizing the importance of reducing sitting time and increasing physical activity.[48] Similarly, the American College of Sports Medicine has provided recommendations not only for regular physical activity but also for reducing overall sedentary time.[49]

Much like the general population, pregnant women often spend a significant portion of their day in a sedentary state.[50, 51] This prolonged sitting during pregnancy has been linked to a higher risk of gestational diabetes mellitus, a significant factor in macrosomia (excessive birth weight) risk.[52] Maternal sedentary behavior during pregnancy can lead to unfavorable changes in cardiometabolic factors like increased blood pressure, triglycerides, and glucose metabolism.[53] These changes can impact the intrauterine environment and fetal development. An altered intrauterine environment may negatively affect fetal nutrition in the short term, potentially increasing the risk of fetal overgrowth, and in the long term, it can program the somatotrophic axes responsible for metabolism and postnatal growth. [54, 55]

Previous studies examining the connection between maternal sedentary behavior during pregnancy and offspring birth size, an indicator of newborn health and future disease risk, have produced mixed results.Both low and high birthweight, as well as a high ponderal index (a measure of body mass aboutthe length), are associated with an elevated risk of obesity and cardiovascular disease later in life.[56-58] Some studies have found links between sedentary behavior during pregnancy and lower birth weight, while others have identified an increased risk of macrosomia (excessive birth weight).[59-61] Conversely, some studies have found no such associations.[62, 63, 31] These studies typically consider sedentary behavior independently of other leisure-time activities, such as light or moderate/vigorous physical activity, which could potentially be replaced by sedentary behavior. A more informative approach involves considering leisure-time sedentary behavior, light-intensity physical activity, and moderate/vigorous physical activity together through substitution modeling. This approach explores how one type of activity might replace another, rather than examining each activity type independently in single-activity regression models. Additionally, despite sex-specific differences in fetal growth patterns and how infants respond to changes in the intrauterine environment and maternal behaviors like physical activity, the role of infant sex in the connection between sedentary behavior and offspring birth size has not yet been explored.[59-61]

Achieving good health is the aspiration of every person, and one way to attain it is by engaging in consistent physical activities. When these physical activities are organized and systematic, they are referred to as exercise. [64] Exercise is vital for everyone, regardless of age, and it holds particular

significance for pregnant women. During pregnancy, following an exercise regimen offers numerous advantages. It can enhance overall physical fitness and alleviate some of the discomforts commonly experienced during pregnancy.[65]

Pregnancy is a natural bodily process, and any interventions offered during this time should be both beneficial and acceptable to pregnant women. Pregnancy presents an opportune moment to engage in physical activity due to increased motivation for a healthy lifestyle and frequent medical appointments that facilitate exercise monitoring. Regular physical exercise during pregnancy offers numerous advantages, including a reduced risk of conditions like gestational diabetes, hypertensive disorders, operative deliveries, excessive weight gain, postpartum weight retention, and postpartum depression.[66]

Several systematic reviews have supported the positive effects of physical activity during pregnancy. These reviews indicate that physically active pregnant women are less likely to experience excessive gestational weight gain and have a reduced risk of gestational diabetes. Some studies suggest that physical activity in early pregnancy may help prevent conditions like preeclampsia and reduce the severity of low back and lumbopelvic pain.Additionally, engaging in moderate-intensity exercise throughout pregnancy does not increase the risk of preterm delivery or affect the baby's birth weight.[67-69]

Various countries have published guidelines recommending the level of physical activity that pregnant women should aim for. However, these guidelines vary in terms of the recommended duration and frequency of exercise. For instance, the United States recommends moderate-intensity exercise for 30 minutes on most days of the week, while Japan recommends 60 minutes of aerobic exercise 2-3 times a week, and Norway recommends 30 minutes of aerobic exercise daily. Generally, international guidelines suggest 120-210 minutes of physical activity per week for pregnant women.[71, 22]

The PARmedx and WHOQOL tools play important roles in assessing and enhancing the health and well-being of individuals and communities, whether through exercise readiness evaluation or comprehensive quality of life assessment.[72, 73]

PARmed-X for PREGNANCY serves as a set of guidelines for conducting health assessments before enrolling in prenatal fitness classes or engaging in exercise during pregnancy. Women with uncomplicated pregnancies can safely incorporate physical activity into their daily routines and participate in such programs without significant risks to their health or the well-being of their unborn child. These programs are believed to offer several advantages, including enhanced cardiovascular and muscular fitness, support for appropriate weight gain, and assistance in labor preparation. Furthermore, regular exercise may contribute to the prevention of gestational glucose intolerance and pregnancy-induced hypertension.

The safety of prenatal exercise programs relies on maintaining a sufficient level of physiological well-being for both the mother and the fetus. PARmed-X for PREGNANCY provides a practical checklist and guidance for healthcare providers to assess pregnant individuals who wish to join prenatal fitness initiatives and to continuously monitor the medical status of pregnant individuals engaged in exercise.

PARmedx is a pre-exercise screening tool and a medical examination designed to assess an individual's readiness for physical activity or exercise. It is widely used by healthcare professionals and fitness instructors to determine if a person can safely engage in physical activity. PARmedx helps identify potential health risks, such as cardiovascular issues, musculoskeletal problems, or other medical conditions that may affect a person's ability to participate in exercise safely. It includes a series of questions related to an individual's medical history, current health status, and any symptoms they may be experiencing. The responses to these questions help healthcare providers and fitness experts make informed decisions about whether it's safe for someone to engage in physical activity. PARmedx assists in designing exercise programs that are appropriate for an individual's health status and fitness goals. It plays a crucial role in preventing exercise-related injuries and complications, especially for those with underlying medical conditions.PARmedx could be used to determine whether primigravida women are physically prepared to participate in the antenatal physiotherapy module, ensuring their safety during the program.[72]

WHOQOL is a set of assessment tools developed by the World Health Organization (WHO) to measure the quality of life of individuals across different cultures and regions. It encompasses various domains, including physical health, psychological well-being, social relationships, and environmental factors. WHOQOL is used in research and clinical practice to evaluate the overall well-being and quality of life of individuals or populations. WHOQOL questionnaires are available in different versions, including the WHOQOL-100 and WHOQOL-BREF, designed for different purposes and populations. The assessment covers

four main domains: physical health, psychological well-being, social relationships, and environment. It aims to provide a comprehensive understanding of a person's quality of life and the factors that influence it. WHOQOL assessments are valuable for healthcare professionals, researchers, and policymakers in evaluating the effectiveness of interventions and healthcare programs and in addressing the holistic well-being of individuals and communities.[73]

Here are the key features and components of the WHOQOL-BREF:

1. Multidimensional Assessment: The WHOQOL-BREF evaluates the quality of life across four broad domains:
    - Physical Health: This domain assesses aspects related to an individual's physical well-being, including activities of daily living, energy and fatigue, mobility, pain, and sleep.
    - Psychological Health: It examines an individual's mental well-being, covering areas such as self-esteem, body image, negative and positive feelings, and cognitive functions like concentration and memory.
    - Social Relationships: This domain explores the quality of social interactions and relationships, including social support, personal relationships, and sexual activity.
    - Environment: It evaluates the physical and social environment in which a person lives, encompassing financial resources, safety, health services, and access to information and leisure activities.
2. Comprehensive Assessment: Within each of these four domains, the WHOQOL-BREF includes various facets or items that provide a comprehensive evaluation of different aspects of well-being.
3. Shortened Version: One of the primary advantages of the WHOQOL-BREF is its brevity, with 26 items. This makes it a practical tool for both research and clinical settings, as it can be administered relatively quickly.
4. Global Quality of Life and General Health: The questionnaire also includes two items that assess a person's overall perception of their quality of life and general health.
5. Universally Applicable: The WHOQOL-BREF is designed for use across diverse cultures and populations. It has been translated into multiple languages and validated in various countries, allowing for cross-cultural comparisons.
6. Validated Psychometric Properties: The questionnaire has been rigorously tested for its reliability and validity. It demonstrates good internal consistency, test-retest reliability, and construct validity.
7. Self-Administered or Interviewer-Administered: The WHOQOL-BREF can be administered in either a self-report format or as an interviewer-administered questionnaire, which allows for adaptability to different research and clinical settings.

It is important to include a variety of outcome measures to comprehensively assess the impact of the intervention. Here are some outcome measures that may be considered including:[74-76]

Maternal outcomes

play a crucial role in assessing the health and well-being of pregnant individuals. Understanding the impact of pain and discomfort, weight gain, and overall quality of life during pregnancy is essential for providing comprehensive prenatal care. Let's delve into these maternal outcomes in detail:

Pain and Discomfort:

Pregnancy can be associated with various types of discomfort and pain. Assessing these aspects is vital for ensuring the well-being of expectant mothers.

Pain Levels: To evaluate maternal pain levels, consider using a validated pain scale, such as the Visual Analog Scale (VAS). VAS allows individuals to rate their pain intensity on a scale from 0 to 10, with 0 indicating no pain and 10 representing the worst possible pain. This assessment can help healthcare providers monitor changes in pain levels over time.

Discomfort Scale: The Maternal Physical Discomfort Scale can be a valuable tool for assessing discomfort during pregnancy. This scale typically includes components that address various discomfort areas:

Head and Neck Discomfort: Assess any discomfort related to headaches, neck tension, or other head and neck issues.

Lower Limb Discomfort: Evaluate discomfort in the lower limbs, which can include leg pain, swelling, or cramps.

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

Pelvic, Bladder, and Genital Discomfort: Assess discomfort related to the pelvic area, bladder, and genital region. This can include pelvic pain or urinary discomfort.

Stomach and Bowel Discomfort: Evaluate any discomfort or pain related to digestive issues, such as constipation, indigestion, or bloating.

Other Discomforts: Consider any other discomforts experienced by pregnant individuals, such as back pain, shortness of breath, or skin issues.

Weight Gain: Gestational weight gain is a critical aspect of pregnancy, and monitoring it is important for maternal and fetal health.

Total Weight Gain: Measure the total gestational weight gain in kilograms. Tracking weight gain helps identify whether it falls within recommended guidelines, which can vary based on pre-pregnancy BMI. This measurement provides insights into the nutritional status and overall health of the pregnant individual.

Rate of Weight Gain: Assess the rate of weight gain, typically in kilograms per month. Monitoring weight gain throughout pregnancy can help detect abnormal patterns and ensure that the individual is gaining an appropriate amount of weight to support a healthy pregnancy.

Quality of Life (QoL): Quality of life is a multidimensional aspect of maternal well-being that extends beyond physical health. Assessing QoL provides a comprehensive view of the individual's overall life satisfaction and well-being during pregnancy.

WHOQOL Bref Questionnaire: Administer the World Health Organization Quality of Life (WHOQOL) Bref questionnaire to assess the quality of life of pregnant individuals. This validated questionnaire covers various domains, including:

Physical Health: Evaluate the physical well-being, functional capacity, and the impact of pregnancy-related physical changes.

Psychological Well-being: Assess emotional and psychological aspects, including stress, anxiety, and overall mental health.

Social Relationships: Explore the quality of social interactions, support systems, and relationships during pregnancy.

Environment: Consider the physical and social environment in which the individual lives, including access to healthcare, safety, and financial stability.

Administering the WHOQOL Bref questionnaire allows for a comprehensive evaluation of the individual's quality of life and helps identify areas where additional support and intervention may be needed to enhance maternal well-being during pregnancy.

In summary, assessing maternal outcomes during pregnancy is crucial for providing comprehensive prenatal care and support. Monitoring pain and discomfort, weight gain, and quality of life allows healthcare providers to tailor interventions and support strategies to improve the overall well-being of pregnant individuals, ensuring a healthier and more positive pregnancy experience.

Pregnancy and birth outcomes

These are essential components of maternal and newborn health assessments. Accurate documentation and assessment of these outcomes provide valuable insights into the health and well-being of both the pregnant individual and the newborn. Here, we'll explore these outcomes in detail:

Duration of Pregnancy:

Recording the length of gestation is a fundamental aspect of monitoring pregnancy progress and assessing potential complications.

Gestation in Weeks: Calculate the duration of pregnancy in weeks, typically from the first day of the last menstrual period (LMP) to the date of delivery. This measurement helps determine whether the pregnancy is full-term or preterm.

Labor and Delivery Phases:

Categorizing and documenting the phases of labor is crucial for understanding the progression of childbirth.

Latent Phase: This phase marks the early stage of labor when the cervix is beginning to dilate and efface. It can be a lengthy process, and its duration may vary among individuals.

Active Phase: The active phase follows the latent phase and involves more rapid cervical dilation. It can be further divided into different stages based on the rate of cervical change.

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

Second Stage: This is the stage of labor when the cervix is fully dilated, and the individual begins to push during contractions to facilitate the birth of the baby.

Intensity of Pain during Labor:

Assessing the intensity of pain experienced during labor is essential for providing appropriate pain management and support.

Standardized Pain Assessment Scale: Use a standardized pain assessment scale, such as the Visual Analog Scale (VAS). VAS typically consists of a 10-point continuum, where 0 indicates no pain, and 10 represents the worst possible pain. Participants can use this scale to rate their pain intensity during different stages of labor.

Type of Delivery:

Categorizing the mode of delivery provides insights into the birth process and can help assess the potential impact on maternal and newborn health.

Spontaneous Vaginal Delivery: This is the most common mode of delivery, where the baby is born through the birth canal without the need for interventions.

Assisted Vaginal Delivery: In some cases, assisted vaginal delivery may be necessary. This involves the use of instruments such as forceps or vacuum extraction to assist in the birth of the baby.

Cesarean Section (C-Section): When a vaginal delivery is not feasible or safe, a cesarean section may be performed. This surgical procedure involves making an incision in the abdomen and uterus to deliver the baby.

Monitoring and documenting these pregnancy and birth outcomes is critical for healthcare providers to ensure the safe and healthy delivery of the newborn and the well-being of the pregnant individual. It also allows for the timely identification of any complications or deviations from the normal progression of pregnancy and labor. Comprehensive record-keeping and assessments enable healthcare teams to provide appropriate care and interventions, enhancing the overall experience of pregnancy and childbirth for both the mother and newborn.

Infant Outcomes:

Infant outcomes are critical indicators of a newborn's health and well-being, both immediately after birth and during early development. Two essential infant outcomes that healthcare providers monitor closely are Apgar scores and infant growth. Let's delve into these outcomes in detail:

Apgar Scores:

Apgar scores are a standardized assessment tool used to evaluate the physical condition and well-being of newborns shortly after birth. They are typically assessed at 1 minute and 5 minutes after delivery. The Apgar score is calculated based on five key criteria, each scored on a scale from 0 to 2, with 2 being the highest score:

Appearance (skin color): A score of 2 indicates a pink or rosy complexion, 1 indicates a body that is pink but extremities are bluish, and 0 suggests a pale or blue appearance.

Pulse (heart rate): A score of 2 represents a heart rate over 100 beats per minute, 1 indicates a heart rate below 100, and 0 signifies no detectable heart rate.

Grimace response (reflex irritability): A score of 2 means a vigorous cry or active withdrawal from a stimulus, 1 indicates a feeble response to stimulation, and 0 suggests no response to stimulation.

Activity (muscle tone): A score of 2 denotes strong, active movement, 1 suggests some flexion but predominantly limp extremities, and 0 signifies no muscle tone.

Respiration (breathing rate and effort): A score of 2 indicates strong, regular breathing, 1 suggests irregular, slow, or shallow breathing, and 0 signifies no breathing.

The total Apgar score ranges from 0 to 10, with a higher score indicating better overall physical condition. Apgar scores are important for quickly assessing whether a newborn requires immediate medical attention or resuscitation.

Infant Growth:

Monitoring infant growth is an ongoing process that involves assessing several key measurements:

Weight: Newborns are weighed shortly after birth, and this measurement provides insight into their nutritional status and general health. Weight gain in the weeks and months following birth is also closely monitored to ensure healthy growth and development.

Height (Length): Measuring the length of a newborn helps track linear growth. This measurement provides information about skeletal growth and overall development. Height measurements continue to be monitored during well-baby visits and routine check-ups.

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

Head Circumference: The circumference of the infant's head is measured to monitor brain growth and development. This measurement is essential for assessing head shape and ensuring that the infant's brain is growing appropriately.

It's important to conduct regular follow-up assessments of infant growth during well-baby visits and check-ups. Comparing these measurements to standard growth charts helps healthcare providers identify any deviations from normal growth patterns. Early detection of growth issues allows for timely intervention and support to ensure that the infant is thriving and developing as expected.

In summary, infant outcomes, as assessed by Apgar scores and measurements of growth, are critical for evaluating the health and well-being of newborns. These assessments help healthcare providers make immediate decisions about the newborn's condition after birth and provide ongoing guidance to ensure that the infant continues to grow and develop in a healthy and thriving manner.

These outcome measures will help to evaluate the impact of the structured antenatal physiotherapy module on various aspects of maternal well-being, pregnancy and childbirth outcomes, and the health of newborns. Therefore in this study the various outcome measures such as Postpartum assessment: Average rate of weight gain (kg/month) and total gestational weight gain (kg), Pregnancy Outcomes: Duration of pregnancy, Delivery phases, Intensity of pain during labor stages, Type of delivery, Infants' Physiological Indexes: 1 and 5-minute Apgar scores, weight, height and head circumference, WHOQOL Bref: Domains- Physical health, Psychological, Social relationships, Environment, and Maternal Physical Discomfort Scale: 5 components- 1. Head and neck discomfort 2. Lower limb discomforts 3. Pelvic, bladder, and genital discomforts 4. Stomach and bowel discomfort 5. Other discomforts were utilized to assess the effectiveness of the structured antenatal physiotherapy module.

Materials and method

The present randomized controlled trial was conducted at the Department of Obstetrics and Gynaecology, KIMSDU after the institutional ethical committee approval. A total of 108 subjects (n=54 in each group) selected by simple random sample method by fulfilling the inclusion and exclusion criteria were involved in the study after informed consent was obtained. Duration of the study was 4 years.

Healthy women with uncomplicated pregnancies who fulfill the PARmed-X (Physical Activity Readiness medical examination) guidelines form which should be signed by a certified obstetrician and Gynecologist, Primigravida women between the age group of 20-29 years, Gestational age of 25 weeks- 37 weeks, Singleton pregnancy, Women with normal Body mass index (BMI) during the first antenatal visit and participants willing to participate were inclusion criteria for the study. Womens with Incompetent cervix/cerclage, Preterm premature ruptured membranes, Multiple gestation at the risk of premature labor, Persistent first or second-trimester bleeding, Women with heart disease or any other systemic illness, Low-lying Placenta, Restrictive lung disease, Other significant medical conditions and womens having limitations to do physical activities and not willing to participate were excluded from the study.

Subjects were divided into 2 groups. Group A was treated with standard antenatal care and conventional Physiotherapy Exercises. Standard antenatal care include breathing exercises and thoracic expansion exercises for 1st and 2nd stage of labor, for Endurance Training we included aerobic Exercises like Walking for 20 minutes, 5 days/week at the patient's comfortable speed was advocated which is practiced at home. For Flexibility, Mild stretching exercises with 20 seconds hold with 3 repetitions and 20 seconds rest in between stretches as a part of warm-up and stretching for Hip adductors, Hamstrings, Gastrosoleus, PectoralsShoulder musclesUpper trapezius were given.For pelvic floor strengthening: Isolated Pelvic floor exercises.were given for10-15 times; 3 times a day. For relaxation, Progressive Muscular Relaxation technique- 5-7 minutes as a part of cool down.Visual imagery techniqueand Self Massage was taught. For Ergonomic advice booklets were given which included do's and don'ts of pregnancy: Back care, Maintenance of Posture, Lifting techniques, and Posture while sitting and sleeping.

Group B was treated with Standard Antenatal Care and Structured Antenatal Physiotherapy Module which includes, for endurance, flexibility, pelvic floor, relaxation exercises and ergonomic advice given same as group A. For strengthening, Upper limb and lower limb strengthening exercises were given with using light weights by a half kg sandbag.All exercises were done for 1-2 sets of 12-15 repetitions, 3 days/week on alternate days. We gave pilates exercises which included Pelvic tilt, Bent knee fallout, Bridge, Hamstring stretch, Modified one hundred, All fours,, Side lying- Clamming. For relaxation, Jacobson's Relaxation exerciseswere given and ergonomic advice were

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

given. All exercises were done for 1-2 sets of 10-20 repetitions, 4-5 days/week. Training of labor positions, Breathing exercises for labor: 1st and 2nd Stages of labor, Visual Imagery techniques, Non-pharmacological methods of pain relief during each stage of labor like - Massage, TENS, Role play: Stages of labor, Preparation for the postnatal period were given during 35th-37th week. 1 set of exercises were given during all 5 visits for 25th week to 34th week.

Results

Age

The mean age of the group A and B subjects was 24.33±2.71 years and 27.37±2.88 years respectively. There was no significant difference in the mean age between the groups (P=0.9452) (Table 1.1 and Figure 1.1).

Table 1.1. Comparison of mean age between groups

Groups	Age (years)		P value
	Mean	SD	
A	24.33	2.71	0.9452
B	24.37	2.88	

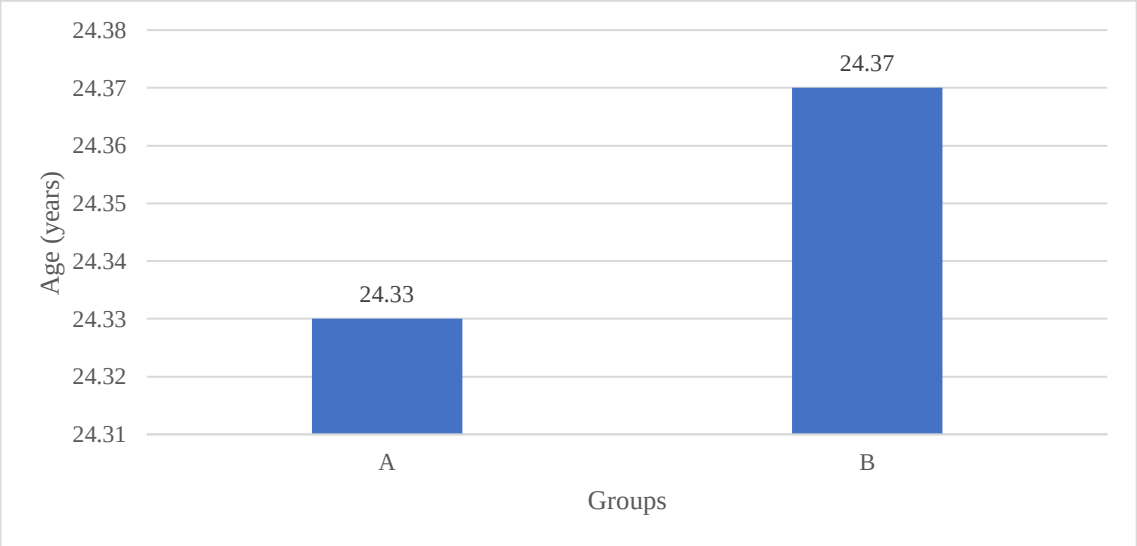

Figure 1.1. Comparison of mean age between groups

In group A, the majority of subjects (37.04%, n=20) belonged to the 26-29 years age groups followed by 33.33% (n=18) and 29.63% (n=16) belonged 23-25 years and 20-22 years age categories respectively. Whereas, in group B, the maximum number of subjects (38.89%, n=21) had aged in the range of 26-29 years followed by 33.33% (n=18) and 27.78% (n=15) of patients aged 20-22 years and 23-25 years age categories respectively. The distribution of subjects according to age categories is depicted in Table 1.2 and Figure 1.2.

Table 1.2. The distribution of subjects according to age categories

Age (years)	Group A		Group B	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
20-22	16	29.63	18	33.33
23-25	18	33.33	15	27.78
26-29	20	37.04	21	38.89
Total	54	100	54	100

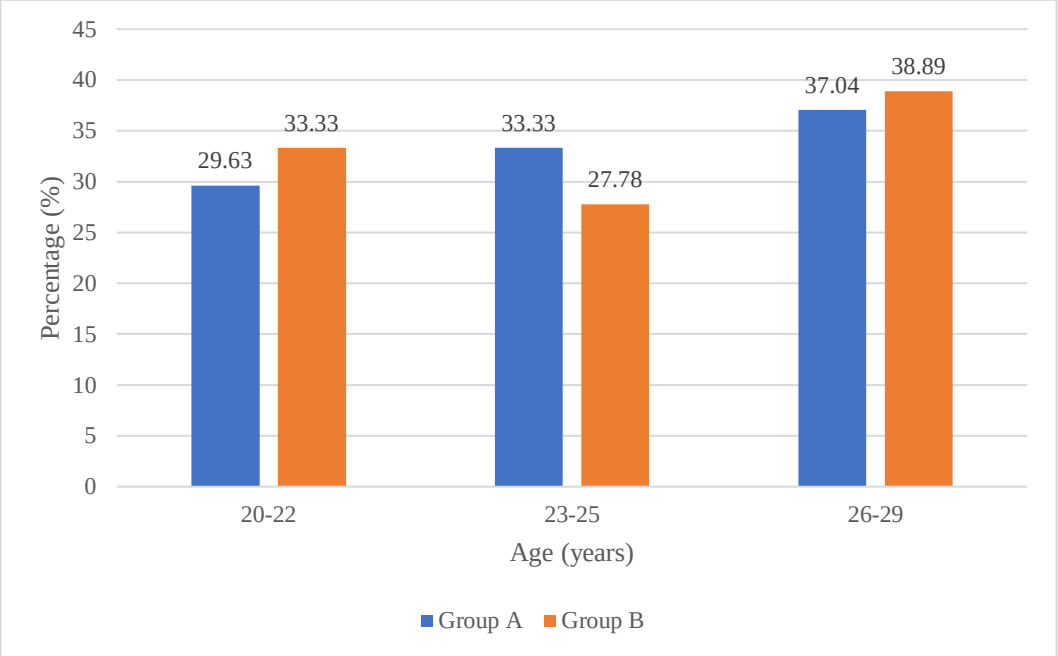

Figure 1.2. The distribution of subjects according to age categories

Assessment at 34 weeks of gestation

WHOQOL BREF

The psychological, social relationships, and environment at 34 weeks of gestationwere significantly better in group B subjects compared to group A subjects (Table 4).

Table 4. Comparison of WHOQOL BREF domains score at 34 weeks of gestation between groups

WHOQOL BREF domains	Group A (mean±SD)	Group B (mean±SD)	P value
Physical health	19.71±6.64	51.25±5.97	<0.0000
Psychological	32.02±6.48	65.58±5.60	<0.0000
Social relationship	27.46±8.20	83.80±9.63	<0.0000
Environment	41.26±7.71	84.02±4.15	<0.0000

Maternal physical discomfort

The proportion of moderate and severe maternal physical discomfort such as head and neck discomfort, lower limb discomfort, pelvic, bladder, and genital discomfort, stomach and bowel discomfort, and other discomfort at 34 weeks of gestation were more in group A subjects compared to group B subjects. The distribution of subjects according to maternal physical discomfort is illustrated in Table 5 and Figure 3.

Table 4. The distribution of subjects according to maternal physical discomfort at 34 weeks of gestation

Groups	Severity	Maternal physical discomfort, % (n)				
		Head and neck	Lower limb	Pelvic, bladder, genital	Stomach and bowel	Other
A	Mild	38.89 (21)	33.33 (18)	37.09 (20)	33.33 (18)	44.44 (24)
	Moderate	14.81 (8)	26.63 (16)	27.78 (15)	38.89 (21)	22.22 (12)
	Severe	1.85 (1)	11.11 (6)	20.37 (11)	3.70 (2)	1.85 (1)

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

	Absent	44.44 (24)	25.93 (14)	14.81 (8)	24.07 (13)	31.48 (17)
B	Mild	16.67 (9)	33.33 (18)	31.48 (17)	16.67 (9)	20.37 (11)
	Moderate	1.85 (1)	5.56 (3)	9.26(5)	0 (0)	0 (0)
	Severe	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Absent	81.48 (44)	61.11 (33)	59.26 (32)	83.33 (45)	79.63 (43)

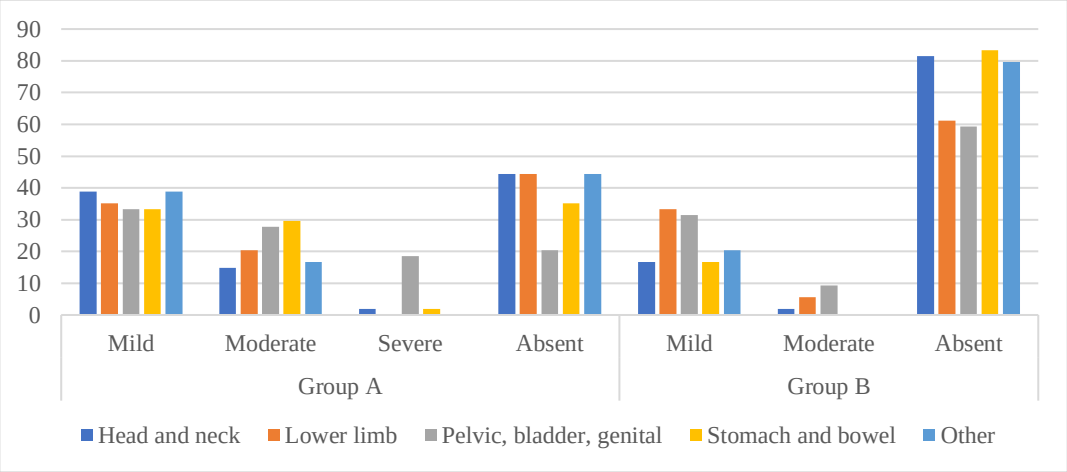

Figure 3.The distribution of subjects according to maternal physical discomfort at 34 weeks of gestation

Postpartum outcome

The mean rate of weight gain was significantly higher in group B subjects compared to group A subjects (1.88±0.23kg/month vs 1.95±0.17kg/month, P=0.0432) (Table 5 and Figure 4.1). The total weight gain in either group was comparable (9.89±1.58kg vs 9.80±0.22kg, P=0.6995) (Table 5 and Figure 4.2).

Table 5. Comparison of postpartum outcomes

Postpartum outcome	Group A	Group B	P value
Rate of weight gain (kg/month)	1.88±0.23	1.95±0.17	0.0432
Total weight gain (kg)	9.89±1.58	9.80±0.22	0.6995

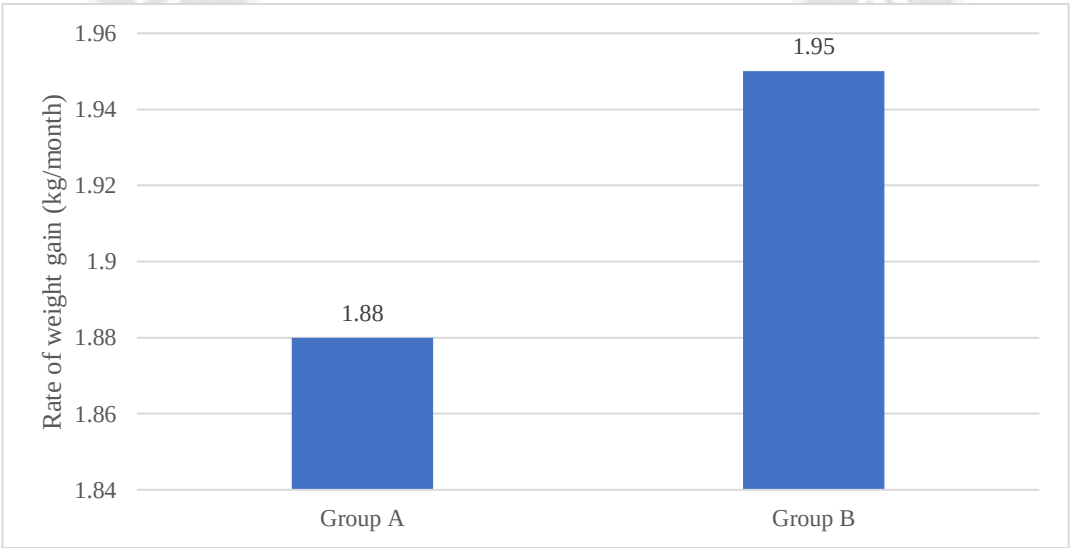

Figure 4.1. Comparison of mean rate of weight gain

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
Article Received: *25 July 2023* ***Revised:*** *12 September 2023* ***Accepted:*** *30 September 2023*

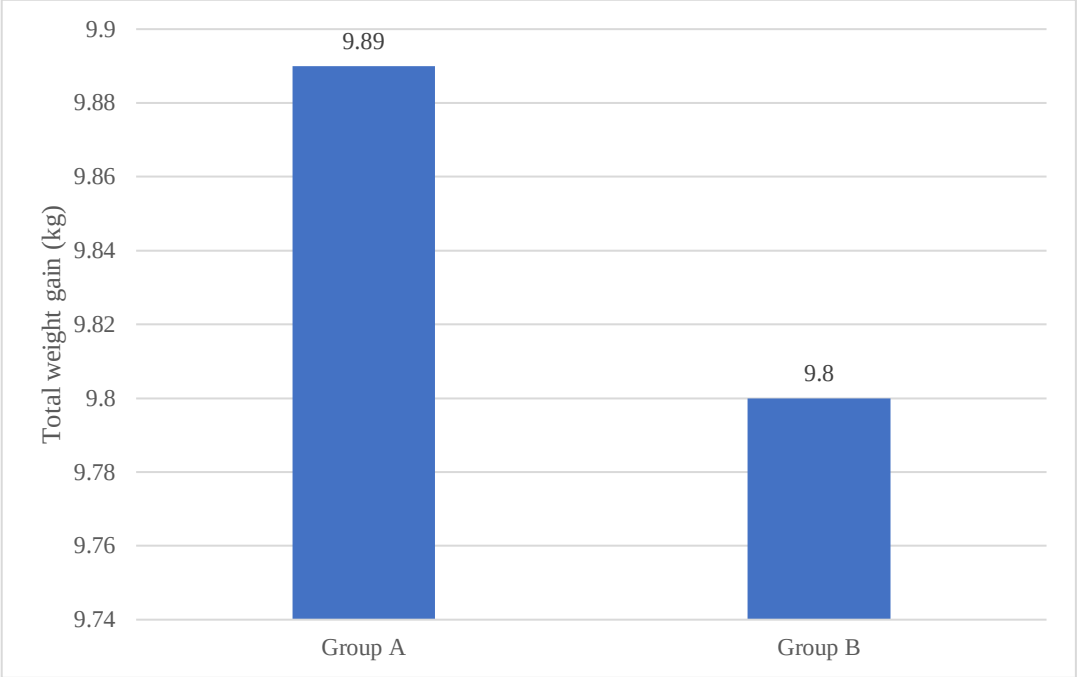

Figure 4.2. Comparison of total weight gain

Duration of delivery

The mean duration of delivery was significantly less in group B individuals compared to group A subjects (631.65±9.81min vs 397.87±11.61min, P<0.0000) (Table 6 and Figure 5).

Table 6. Comparison of duration of delivery

Groups	Duration of delivery (minutes)		P value
	Mean	SD	
A	631.65	9.81	<0.0000
B	397.87	11.61	

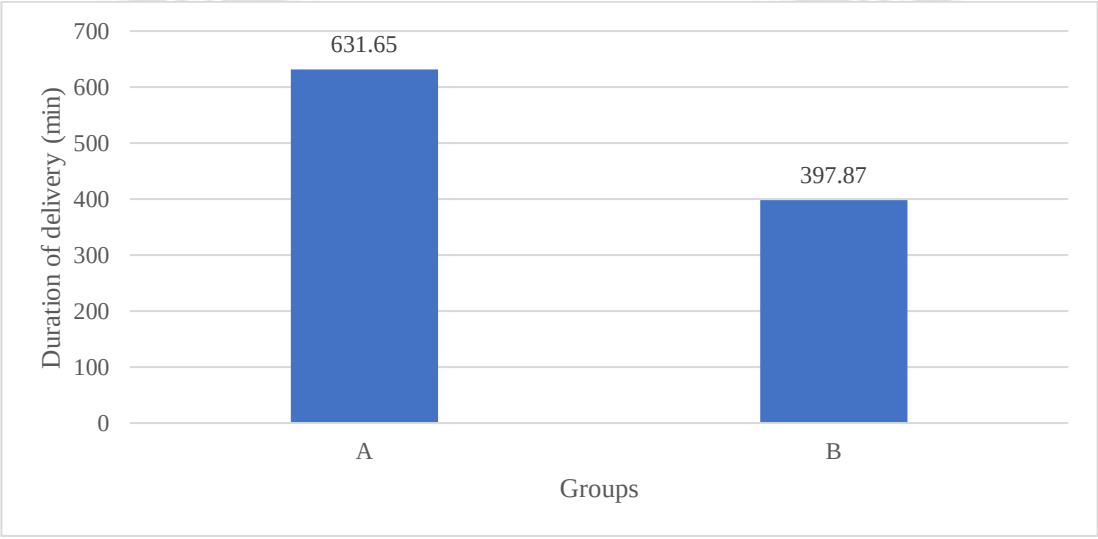

Figure 5. Comparison of duration of delivery

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

Pain intensity

The mean VAS score was more in group B subjects than in group A subjects at all labor stages however, the difference was statistically significant only at stage II of labor (2.98±0.74 vs 3.31±0.64, P=0.0137). The comparison of the mean VAS score according to labor stages is shown in Table 7 and Figure 6.

Table 7. The comparison of the mean VAS score according to labor stages

Labor stages	VAS score (mean)		P value
	Group A	Group B	
I	2.26±0.71	2.28±0.79	0.8977
II	2.98±0.74	3.31±0.64	0.0137
III	1.77±0.57	1.98±0.79	0.1274

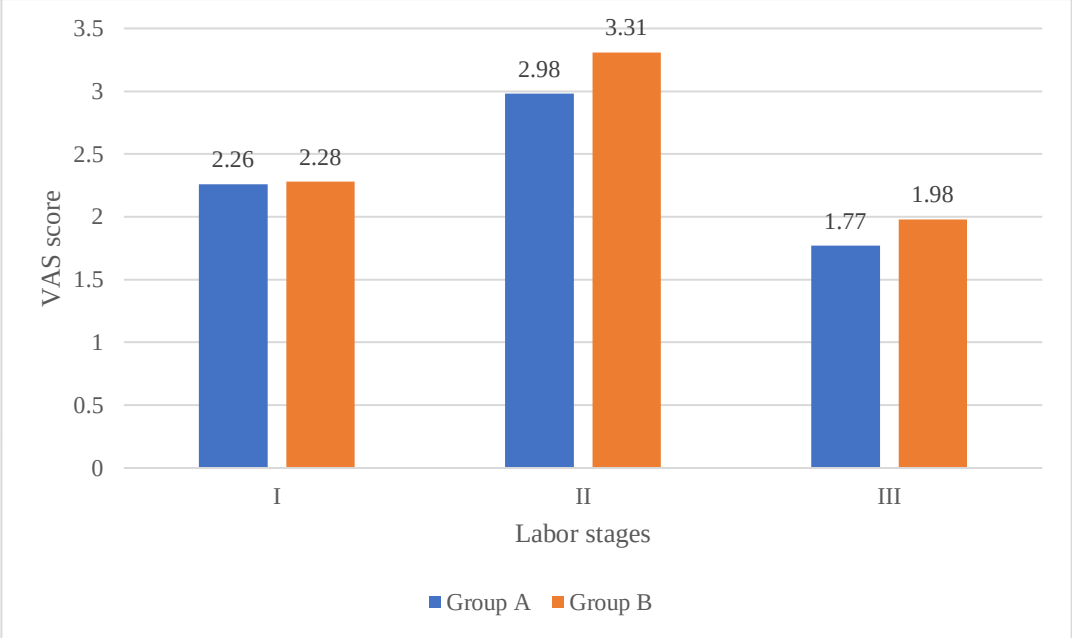

Figure 6. The comparison of the mean VAS score according to labor stages

Type of delivery

The proportion of NVD was more in group B (64.82%, n=35) compared to group A (55.56%, n=30). The distribution of subjects according to the type of delivery is illustrated in Table 8 and Figure 7.

Table 8. The distribution of subjects according to the type of delivery

Type of delivery	Group A		Group B	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
NVD	30	55.56	35	64.82
LSCS	10	18.52	12	22.22
Instrumental	14	25.92	7	12.96
Total	54	100	54	100

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
Article Received: *25 July 2023* ***Revised:*** *12 September 2023* ***Accepted:*** *30 September 2023*

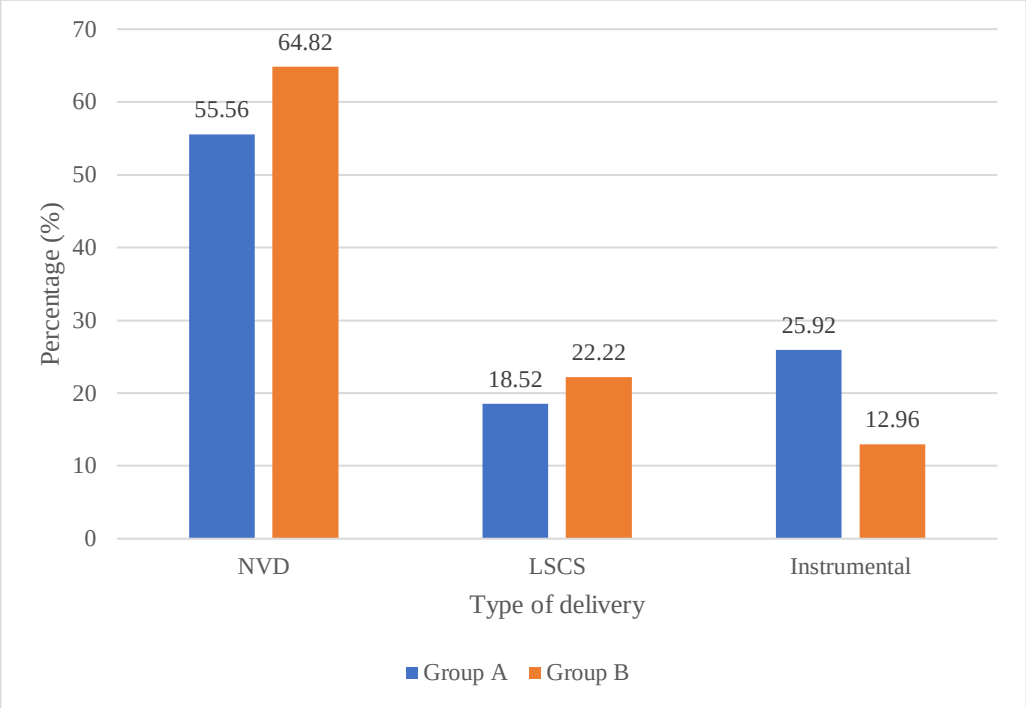

Figure 7. The distribution of subjects according to the type of delivery

Neonatal outcomes

Apgar score at 1min (7.38±0.20 vs 8.83±0.53, P<0.0000) and 5min (8.35±0.17 vs 9.59±0.17, P<0.0000) was significantly more in group B than group A. The birthweight (3213.05±538.49gm vs 3431.80±683.84gm, P<0.0000), birth length (51.89±0.98cm vs 53.78±1.20cm, P<0.0000), and head circumference (30.88±0.97cm vs 32.74±1.32, P<0.0000) of babies delivered by group B mothers were significantly more compared to group A (Table 9).

Table 9. Comparison of neonatal outcomes

Neonatal outcomes	Group A (mean±SD)	Group B (mean±SD)	P value
1min Apgar score	7.38±0.20	8.83±0.53	<0.0000
5min Apgar score	8.35±0.17	9.59±0.17	<0.0000
Birthweight (gm)	3213.05±538.49	3431.80±683.84	<0.0000
Birth length (cm)	51.89±0.98	53.78±1.20	<0.0000
Head circumference (cm)	30.88±0.97	32.74±1.32	<0.0000

WHOQOL BREF

The mean score of WHOQOL BREF domains such as physical health, psychological, social relationship, and the environment was significantly better in group B subjects compared to group A subjects (Table 10).

Table 10. Comparison of WHOQOL BREF domain scores between groups

WHOQOL BREF domains	Group A (mean±SD)	Group B (mean±SD)	P value
Physical health	38.03±12.28	48.30±12.18	<0.0000
Psychological	38.97±9.49	50.12±10.41	<0.0000
Social relationship	54.01±13.03	60.18±10.94	0.0088
Environment	50.12±9.54	58±8.20	<0.0000

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
Article Received: *25 July 2023* ***Revised:*** *12 September 2023* ***Accepted:*** *30 September 2023*

Maternal physical discomfort

The proportion of moderate and severe maternal physical discomfort such as head and neck discomfort, lower limb discomfort, pelvic, bladder, and genital discomfort, stomach and bowel discomfort, and other discomfort were more in group A subjects compared to group B subjects. The distribution of subjects according to maternal physical discomfort is illustrated in Table 11 and Figure 8.

Table 11. The distribution of subjects according to maternal physical discomfort

Groups	Severity	Maternal physical discomfort, % (n)				
		Head and neck	Lower limb	Pelvic, bladder, genital	Stomach and bowel	Other
A	Mild	26.63 (16)	37.03 (20)	37.03 (20)	33.33 (18)	42.59 (23)
	Moderate	16.67 (9)	26.63 (16)	26.63 (16)	27.78 (15)	16.67 (9)
	Severe	3.70 (2)	11.11 (6)	14.81 (8)	20.37 (11)	0 (0)
	Absent	50 (27)	22.22 (12)	18.52 (10)	18.52 (10)	40.74 (22)
B	Mild	33.33 (18)	42.59 (23)	48.14 (26)	37.02 (20)	0 (0)
	Moderate	11.11 (6)	22.22 (12)	26.63 (16)	25.93 (14)	31.48 (17)
	Severe	0 (0)	3.70 (2)	3.70 (2)	3.70 (2)	0 (0)
	Absent	55.56 (30)	31.48 (17)	18.52 (10)	33.33 (18)	68.52 (37)

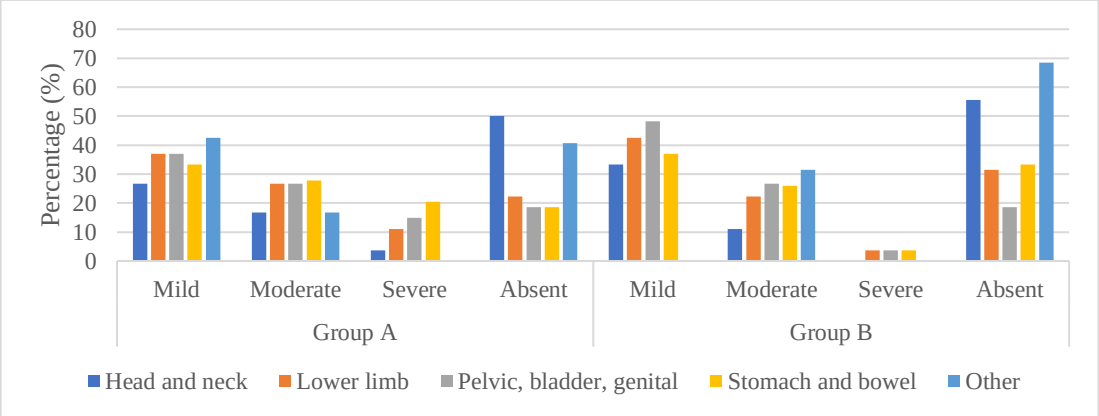

Figure 8. The distribution of subjects according to maternal physical discomfort

Figure 3.The distribution of subjects according to maternal physical discomfort at 34 weeks of gestation

Postpartum outcome

The mean rate of weight gain was significantly higher in group B subjects compared to group A subjects (1.88±0.23kg/month vs 1.95±0.17kg/month, P=0.0432) (Table 5 and Figure 4.1). The total weight gain in either group was comparable (9.89±1.58kg vs 9.80±0.22kg, P=0.6995) (Table 5 and Figure 4.2).

Table 5. Comparison of postpartum outcomes

Postpartum outcome	Group A	Group B	P value
Rate of weight gain (kg/month)	1.88±0.23	1.95±0.17	0.0432
Total weight gain (kg)	9.89±1.58	9.80±0.22	0.6995

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
Article Received: *25 July 2023* ***Revised:*** *12 September 2023* ***Accepted:*** *30 September 2023*

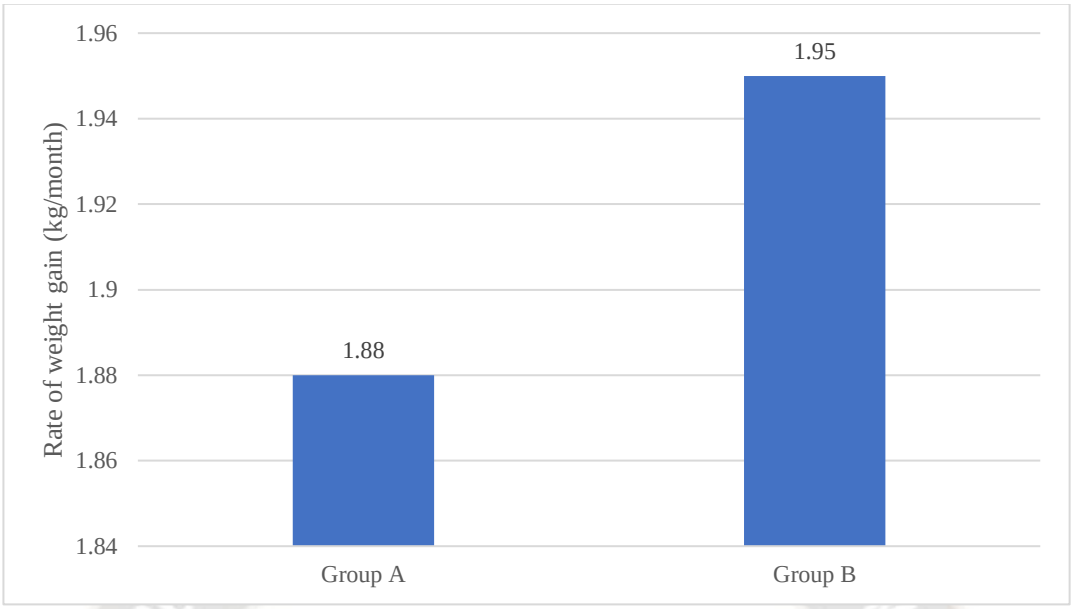

Figure 4.1. Comparison of mean rate of weight gain

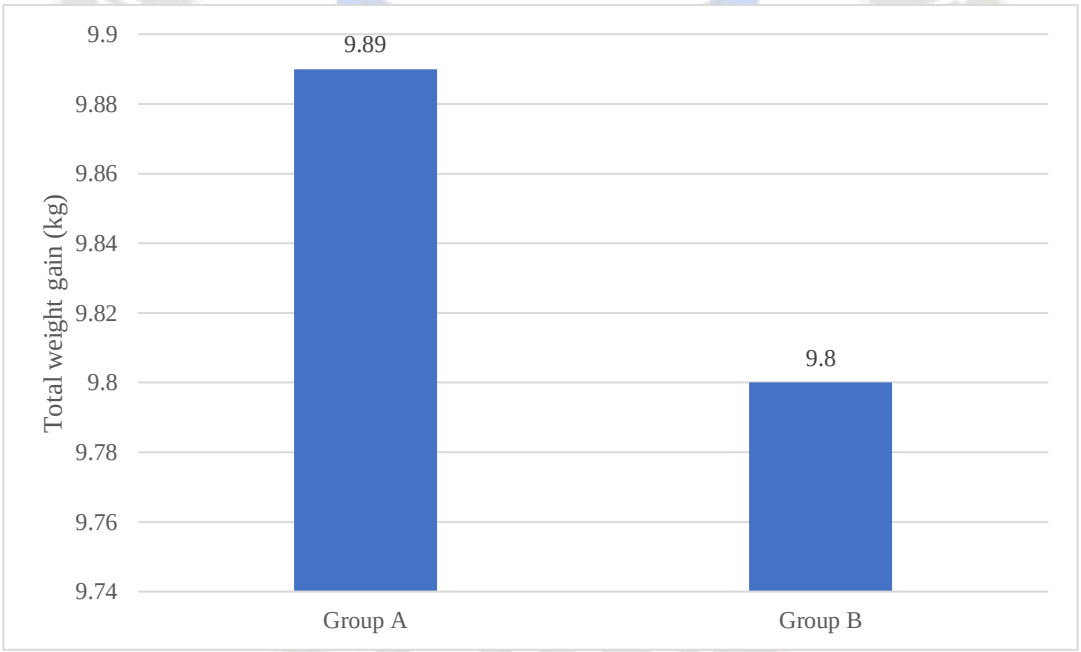

Figure 4.2. Comparison of total weight gain

Duration of delivery

The mean duration of delivery was significantly less in group B individuals compared to group A subjects (631.65±9.81min vs 397.87±11.61min, P<0.0000) (Table 6 and Figure 5).

Table 6. Comparison of duration of delivery

Groups	Duration of delivery (minutes)		P value
	Mean	SD	
A	631.65	9.81	<0.0000
B	397.87	11.61	

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
Article Received: *25 July 2023* ***Revised:*** *12 September 2023* ***Accepted:*** *30 September 2023*

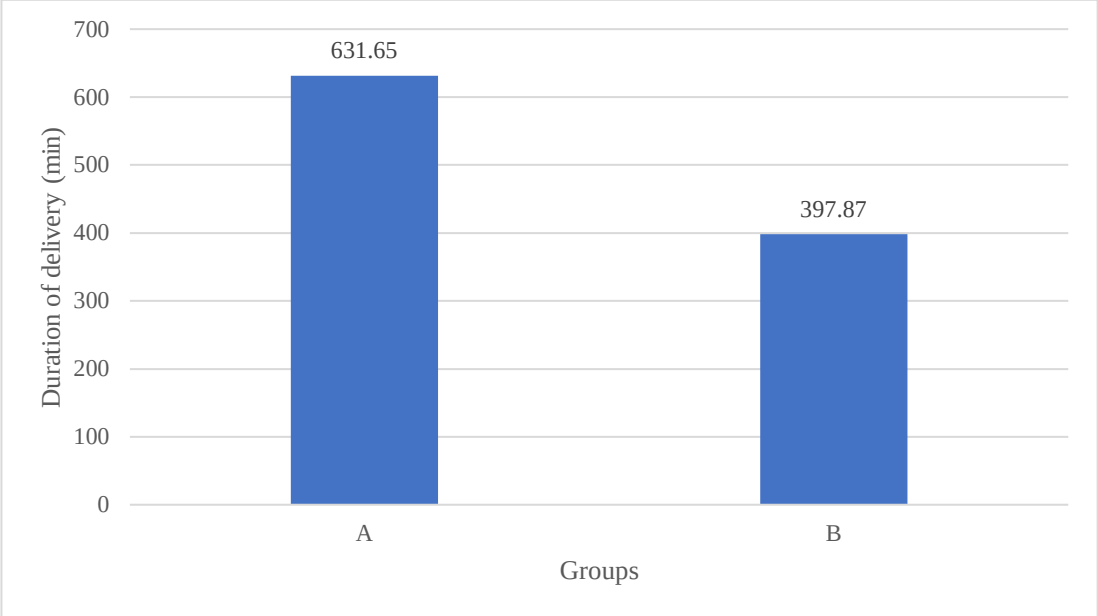

Figure 5. Comparison of duration of delivery

Pain intensity

The mean VAS score was more in group B subjects than in group A subjects at all labor stages however, the difference was statistically significant only at stage II of labor (2.98±0.74 vs 3.31±0.64, P=0.0137). The comparison of the mean VAS score according to labor stages is shown in Table 7 and Figure 6.

Table 7. The comparison of the mean VAS score according to labor stages

Labor stages	VAS score (mean)		P value
	Group A	Group B	
I	2.26±0.71	2.28±0.79	0.8977
II	2.98±0.74	3.31±0.64	0.0137
III	1.77±0.57	1.98±0.79	0.1274

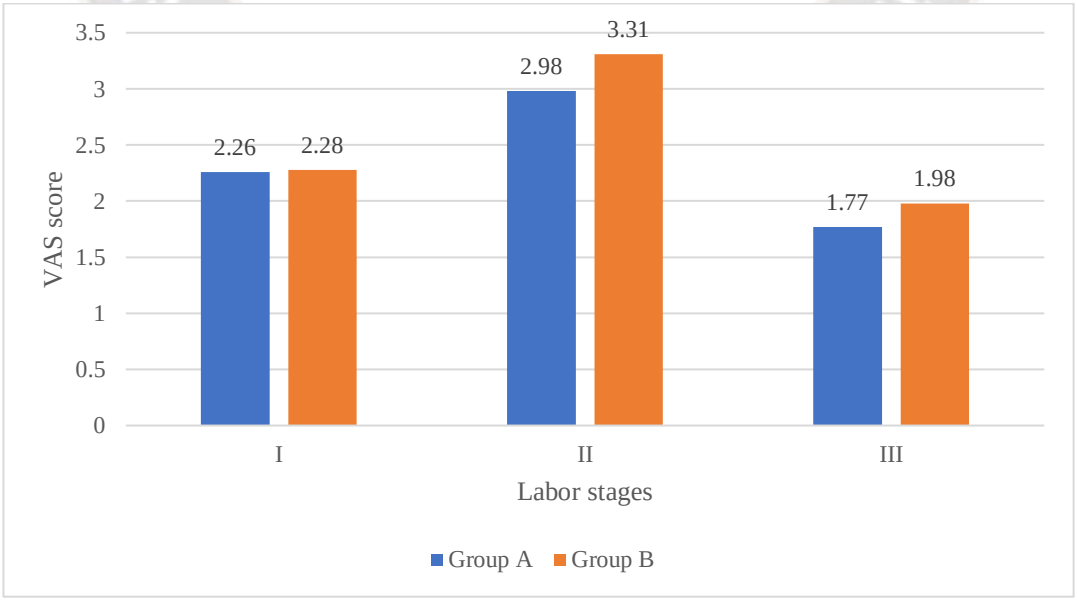

Figure 6. The comparison of the mean VAS score according to labor stages

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

Type of delivery

The proportion of NVD was more in group B (64.82%, n=35) compared to group A (55.56%, n=30). The distribution of subjects according to the type of delivery is illustrated in Table 8 and Figure 7.

Table 8. The distribution of subjects according to the type of delivery

Type of delivery	Group A		Group B	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
NVD	30	55.56	35	64.82
LSCS	10	18.52	12	22.22
Instrumental	14	25.92	7	12.96
Total	54	100	54	100

Figure 3.The distribution of subjects according to maternal physical discomfort at 34 weeks of gestation

Postpartum outcome

The mean rate of weight gain was significantly higher in group B subjects compared to group A subjects (1.88±0.23kg/month vs 1.95±0.17kg/month, P=0.0432) (Table 5 and Figure 4.1). The total weight gain in either group was comparable (9.89±1.58kg vs 9.80±0.22kg, P=0.6995) (Table 5 and Figure 4.2).

Table 5. Comparison of postpartum outcomes

Postpartum outcome	Group A	Group B	P value
Rate of weight gain (kg/month)	1.88±0.23	1.95±0.17	0.0432
Total weight gain (kg)	9.89±1.58	9.80±0.22	0.6995

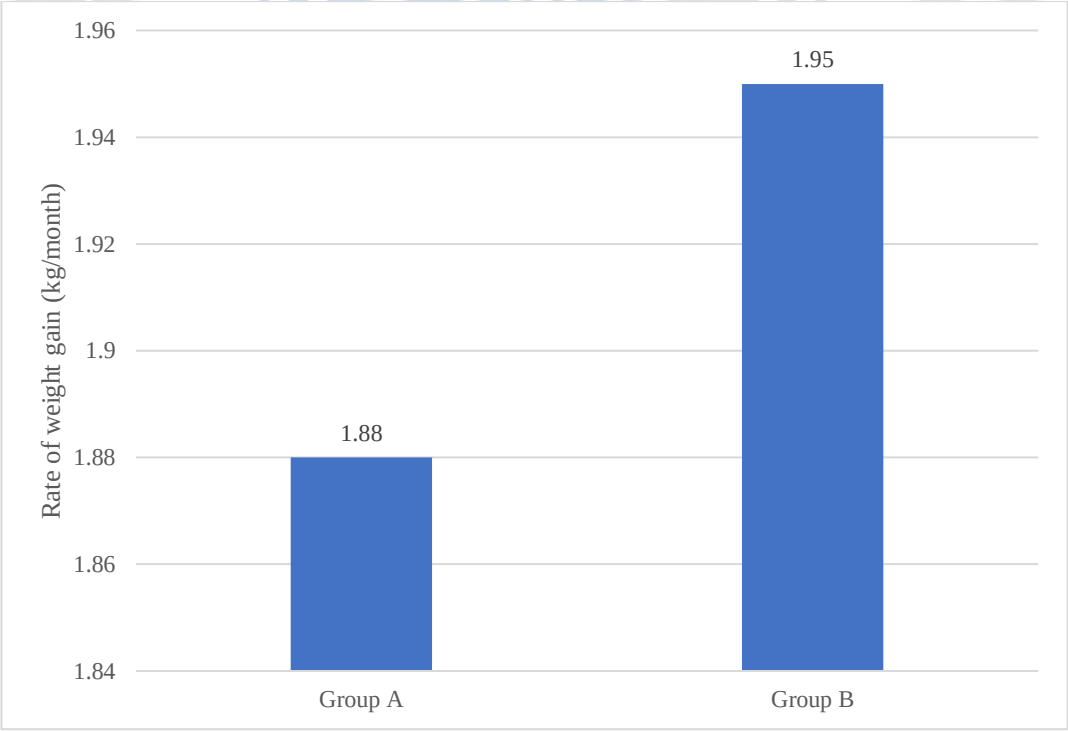

Figure 4.1. Comparison of mean rate of weight gain

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
Article Received: *25 July 2023* ***Revised:*** *12 September 2023* ***Accepted:*** *30 September 2023*

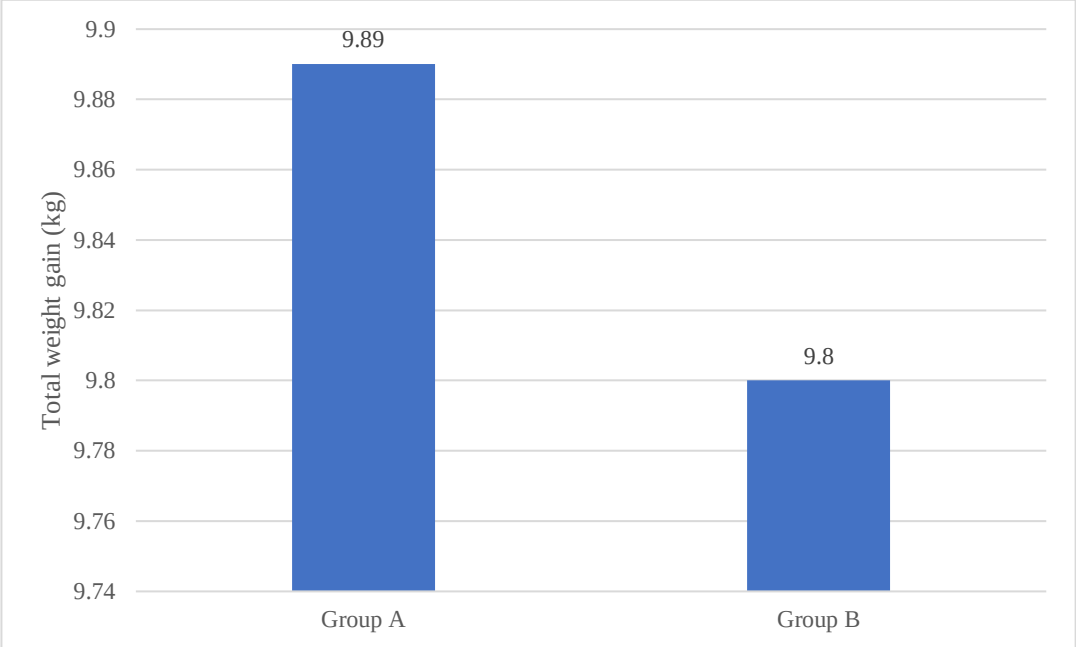

Figure 4.2. Comparison of total weight gain

Duration of delivery

The mean duration of delivery was significantly less in group B individuals compared to group A subjects (631.65±9.81min vs 397.87±11.61min, P<0.0000) (Table 6 and Figure 5).

Table 6. Comparison of duration of delivery

Groups	Duration of delivery (minutes)		P value
	Mean	SD	
A	631.65	9.81	<0.0000
B	397.87	11.61	

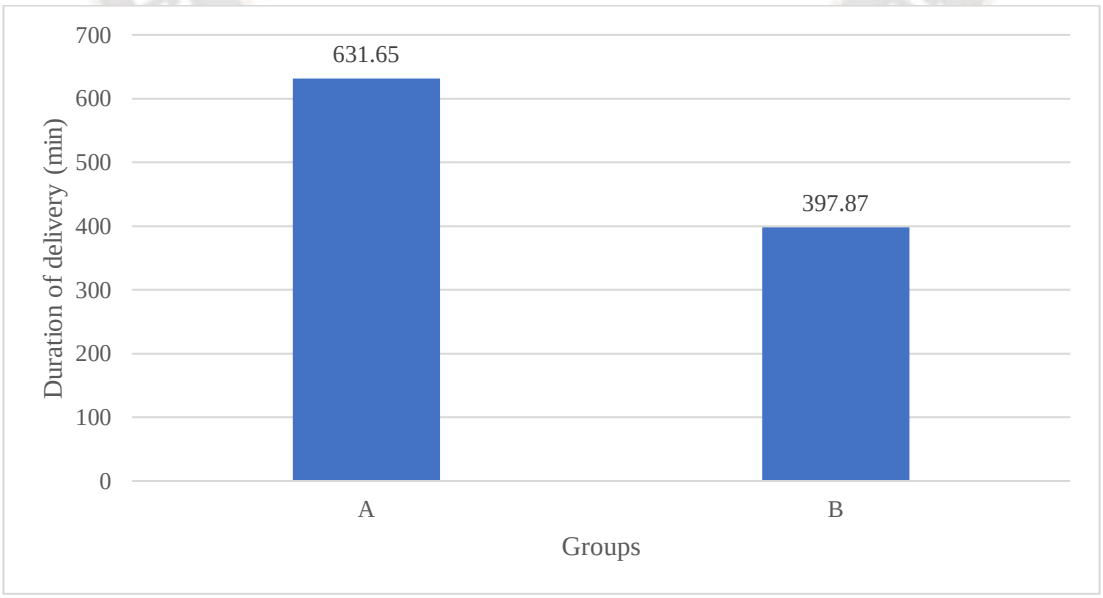

Figure 5. Comparison of duration of delivery

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

Pain intensity

The mean VAS score was more in group B subjects than in group A subjects at all labor stages however, the difference was statistically significant only at stage II of labor (2.98±0.74 vs 3.31±0.64, P=0.0137). The comparison of the mean VAS score according to labor stages is shown in Table 7 and Figure 6.

Table 7. The comparison of the mean VAS score according to labor stages

Labor stages	VAS score (mean)		P value
	Group A	Group B	
I	2.26±0.71	2.28±0.79	0.8977
II	2.98±0.74	3.31±0.64	0.0137
III	1.77±0.57	1.98±0.79	0.1274

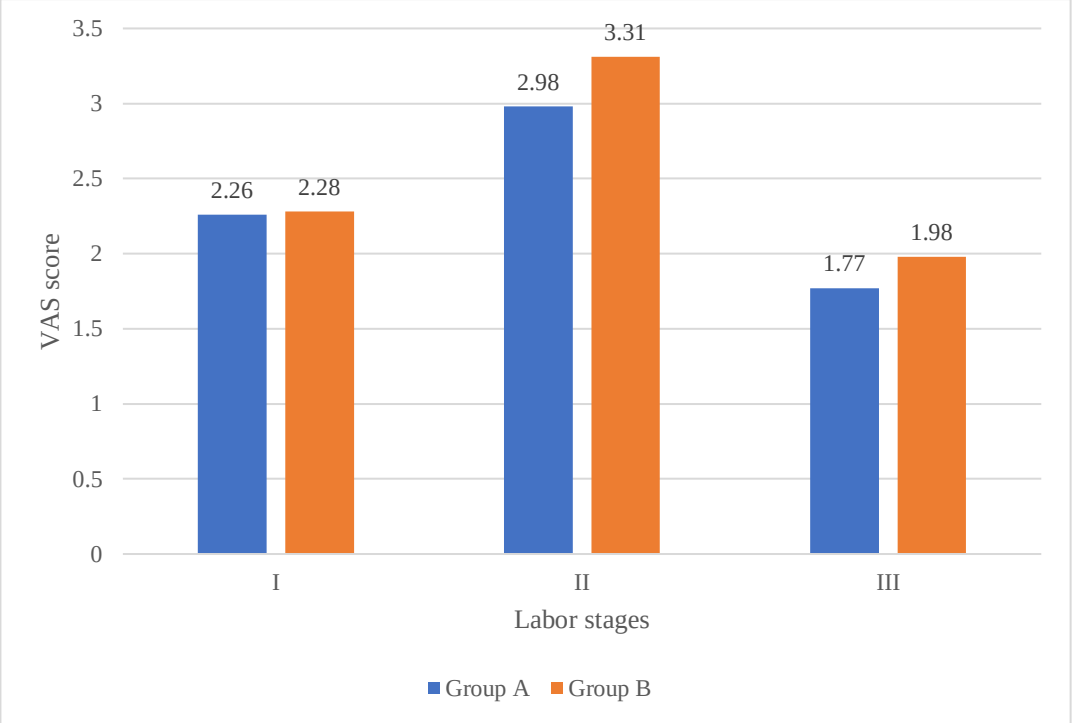

Figure 6. The comparison of the mean VAS score according to labor stages

Type of delivery

The proportion of NVD was more in group B (64.82%, n=35) compared to group A (55.56%, n=30). The distribution of subjects according to the type of delivery is illustrated in Table 8 and Figure 7.

Table 8. The distribution of subjects according to the type of delivery

Type of delivery	Group A		Group B	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
NVD	30	55.56	35	64.82
LSCS	10	18.52	12	22.22
Instrumental	14	25.92	7	12.96
Total	54	100	54	100

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

Discussion

Pregnant women undergo a noticeable decline in their quality of life (QoL) as pregnancy advances, as supported by numerous studies indicating that QoL during pregnancy is notably lower compared to pre-pregnancy levels.[100-102] This reduction is attributed to the physical, psychological, and social challenges faced by women during pregnancy.[100, 103] Factors related to women's health, pregnancy-specific issues, and various coping mechanisms collectively contribute to the overall diminishing QoL throughout pregnancy.[104] Positive perceptions of QoL in pregnant women have been associated with favorable outcomes such as enhanced breastfeeding attitudes and improved sleep quality.[105, 106] Conversely, a lower QoL in pregnant women is connected to adverse conditions such as depression, stress, and complications related to pregnancy, which pose risks to the health of both mother and baby, including the potential for low birth weight.[107]

In alignment with recommendations from the American College of Obstetricians and Gynecologists and the latest exercise guidelines for Americans, it is advised that pregnant women engage in a minimum of 150 minutes of moderate-intensity aerobic exercise per week.[108, 109] However, due to physiological changes during pregnancy that may impact exercise capacity, specific exercise programs may need significant adjustments throughout pregnancy.[101, 110]

Several studies have explored the efficacy of different exercise modules, including aerobic exercises,[100, 111, 112] resistance training,[103, 110, 113, 114] combined approaches (aerobic and resistance),[93, 115, 116] and yoga or physical activity,[101, 117, 118] in enhancing maternal quality of life (QoL). However, as far as our knowledge extends, there is no reported study focusing on the postpartum effectiveness of these exercise modules.

In this study, the mean age of the participants in both groups was within the reproductive age range. The insignificant difference in age between the groups ensures a balanced comparison (24.33±2.71 years vs 27.37±2.88 years, P=0.9452). The distribution of age categories within each group reflects the diversity of the study population, contributing to the generalizability of the findings.by the end of the 34th week of gestation, women who underwent the structured antenatal physiotherapy module exhibited higher mean scores in WHOQOL BREF domains compared to those who received conventional physiotherapy. Furthermore, the prevalence of moderate and severe maternal physical discomfort, encompassing head and neck discomfort, lower limb discomfort, pelvic, bladder, and genital discomfort, stomach and bowel discomfort, and other discomfort, was greater in women undergoing conventional physiotherapy than in those treated with the structured antenatal physiotherapy module.

Montoya Arizabaleta AV et al. found that individuals in the aerobic exercise group reported markedly elevated scores in three out of the four domains comprising the physical component summary of QoL: specifically, in the areas of physical function, bodily pain, and general health.[112] However, Vallimet al.[100] and Seneviratne et al.[111] showed no significant improvement in QoL in pregnant women using the aerobic exercise module. O'Connor PJet al.[110] and Akmese Z et al.[113] suggested significant improvement in women's QoL during pregnancy using a resistance exercise module. However, Nascimento et al.[103] and Petrov et al.[114] showed no improvement in women's QoL. Furthermore, all the studies mentioned on the combined exercise module [93, 115, 116] and yoga or physical activity module [101, 117, 118] demonstrated notable enhancements in QoL, aligning with the findings of the current study. Furthermore, concerning postpartum outcomes, there was a notable increase in the rate of weight gain observed in women who underwent structured antenatal physiotherapy modules compared to those receiving conventional physiotherapy. Nevertheless, the total weight gain was similar in both groups.The average duration of delivery was notably shorter in women who underwent structured antenatal physiotherapy modules in comparison to those in the conventional physiotherapy group. The increased rate of weight gain in group B may indicate a positive association between the structured physiotherapy modules and maternal health. However, it is essential to consider the potential factors contributing to this difference. The significantly shorter duration of delivery in group B suggests that the intervention might have a favorable impact on labor progression, possibly attributed to improved physical fitness and musculoskeletal function.

Although the mean VAS score was higher in subjects with structured antenatal physiotherapy modules across all stages of labor, the statistical significance was observed solely during stage II of labor. Additionally, the percentage of women opting for normal vaginal delivery (NVD) was higher in those with structured antenatal physiotherapy modules (64.82%, n=35) than in patients receiving conventional physiotherapy (55.56%, n=30). Apgar scores at 1 minute and 5 minutes were significantly elevated in the structured antenatal physiotherapy modules group compared to the conventional physiotherapy group. Furthermore, babies born to mothers who underwent structured antenatal

physiotherapy modules exhibited significantly higher birth weight, birth length, and head circumference compared to those born to mothers in the conventional physiotherapy group.The higher proportion of normal vaginal deliveries (NVD) in group B, along with better Apgar scores at 1 and 5 minutes, highlights potential benefits for both maternal and neonatal outcomes associated with the structured physiotherapy intervention. Additionally, the significantly higher birthweight, birth length, and head circumference in babies born to mothers in group B signify potential positive influences on fetal growth and development.

The strength of the study was adequate sample size and uniform application of the protocol. The study assessed maternal QoL and neonatal outcomes as well. The study provides valuable insights into the development and effectiveness of structured antenatal physiotherapy modules, demonstrating their positive impact on maternal well-being, labor outcomes, and neonatal characteristics. The findings contribute to the growing body of evidence supporting the integration of physiotherapy in antenatal care, with potential implications for improving the overall experience of primigravida women during pregnancy and childbirth.

Despite the positive findings, it is crucial to acknowledge the limitations of the study, such as potential confounding variables and the need for further exploration in diverse populations. Future research could focus on long-term outcomes and the sustainability of the observed benefits. Also further studies can be taken up with more number of visits during each trimester and for better results and benefits exercises can be performed under the supervision of Physiotherapist.Additionally, exploring the feasibility of implementing the developed modules in different healthcare settings would contribute to the generalizability and applicability of the intervention.

Conclusion

The study aimed to develop a structured antenatal physiotherapy module and its effectiveness in primigravida women.

- The findings of this randomized controlled trial provide valuable insights into the development and effectiveness of a structured antenatal physiotherapy module for primigravida women. The mean age distribution in both groups demonstrated homogeneity, ensuring that any observed differences in outcomes were not confounded by age variations. The majority of participants fell within the 26-29 years age range, indicating a representative sample.
- the maternal outcomes during delivery demonstrated noteworthy differences between the two groups. Group B individuals experienced a shorter duration of delivery, reduced maternal physical discomfort, and a higher rate of weight gain compared to Group A. These outcomes are indicative of the positive impact of the structured antenatal physiotherapy modules on the overall pregnancy experience.
- The findings related to the mode of delivery and neonatal outcomes underscore the significance of physiotherapy interventions. Group B exhibited a higher proportion of normal vaginal deliveries, improved Apgar scores at 1 and 5 minutes, and significantly favorable birthweight, birth length, and head circumference of babies. These outcomes suggest that the structured physiotherapy modules not only enhance maternal well-being but also positively influence the delivery process and neonatal outcomes.
- The results of this study support the effectiveness of the developed structured antenatal physiotherapy module in improving maternal well-being, reducing physical discomfort, and enhancing delivery outcomes in primigravida women. The positive impact on neonatal outcomes further emphasizes the holistic benefits of incorporating such modules into antenatal care. This study contributes valuable knowledge to the field of antenatal physiotherapy and provides a foundation for the integration of structured modules into routine antenatal care protocols worldwide.
- Further studies are warranted to confirm the present study findings.

Reference:

1. Vijayalakshmi V. A study to assess the effectiveness of selected antenatal exercise in terms of relieving minor disorders among primi gravida women attending antenatal outpatient department at government Rajaji hospital, Madurai (Doctoral dissertation, College of Nursing, Madurai Medical College, Madurai).2011.
2. Sreeja R. Effectiveness of video assisted teaching on knowledge regarding management of minor ailments during pregnancy among primi mothers attending primary health centre in Samayanallur at Madurai (Doctoral dissertation, College of Nursing, Madurai Medical College, Madurai).2015.
3. World Health Organization. Maternal mortality: fact sheet: to improve maternal health, barriers that limit access to quality maternal health services must be identified and addressed at all levels of the health system. World Health Organization; 2014. Accessed

from: https://apps.who.int/iris/bitstream/handle/10665/112318/WHO_RHR_14.06_eng.pdf. Accessed on: 11/09/2023.

4. Prajapati J, Tiwari A. A study on effect of selected antenatal exercises on outcome of labour among primigravida mothers-A literature review. International Journal of Advanced Reseach. 2017;5(3):825-8.
5. United Nations Human Rights Council. Technical guidance on the application of a human-rights based approach to the implementation of policies and programmes to reduce preventable maternal morbidity and mortality. Report of the Office of the United Nations High Commissioner for Human Rights. 2012. Accessed from: https://www2.ohchr.org/english/issues/women/docs/a.hrc.21.22_en.pdf. Accessed on: 11/09/2023.
6. Tunçalp Ö, Were WM, MacLennan C, Oladapo OT, Gülmezoglu AM, Bahl R, Daelmans B, Mathai M, Say L, Kristensen F, Temmerman M. Quality of care for pregnant women and newborns—the WHO vision. Bjog. 2015 Jul;122(8):1045.
7. Alkema L, Chou D, Hogan D, Zhang S, Moller AB, Gemmill A, Fat DM, Boerma T, Temmerman M, Mathers C, Say L. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. The lancet. 2016 Jan 30;387(10017):462-74.
8. Blencowe H, Cousens S, Jassir FB, Say L, Chou D, Mathers C, Hogan D, Shiekh S, Qureshi ZU, You D, Lawn JE. National, regional, and worldwide estimates of stillbirth rates in 2015, with trends from 2000: a systematic analysis. The Lancet Global Health. 2016 Feb 1;4(2):e98-108.
9. Campbell OM, Graham WJ. Strategies for reducing maternal mortality: getting on with what works. The lancet. 2006 Oct 7;368(9543):1284-99.
10. Fisk NM, McKee M, Atun R. Relative and absolute addressability of global disease burden in maternal and perinatal health by investment in R&D. Tropical medicine & international health. 2011 Jun;16(6):662-8.
11. World Health Organization. WHO recommendations on antenatal care for a positive pregnancy experience. World Health Organization; 2016. Accessed from: https://apps.who.int/iris/bitstream/handle/10665/250796/9789241549912-eng.pdf. Accessed on: 11/09/2023.
12. Sobhgol SS, Priddis H, Smith CA, Dahlen HG. Evaluation of the effect of an antenatal pelvic floor muscle exercise programme on female sexual function during pregnancy and the first 3 months following birth: study protocol for a pragmatic randomised controlled trial. Trials. 2019 Dec;20(1):1-1.
13. Baig MF, Ashok Y. Myofascial pain dysfunction syndrome. Oral and Maxillofacial Surgery for the Clinician. 2021:1343-60.
14. Carroli G, Rooney C, Villar J. How effective is antenatal care in preventing maternal mortality and serious morbidity? An overview of the evidence. Paediatr Perinat Epidemiol. 2001;15(Suppl 1):1–42.
15. Soma-Pillay P, Nelson-Piercy C, Tolppanen H, Mebazaa A. Physiological changes in pregnancy: review articles. Cardiovascular journal of Africa. 2016 Mar 1;27(2):89-94.
16. Pascual ZN, Langaker MD. Physiology, pregnancy. InStatPearls [Internet] 2023 May 16. StatPearls Publishing. Accessed from: https://www.ncbi.nlm.nih.gov/books/NBK559304/. Accessed on: 11/09/2023.
17. Jukic AM, Baird DD, Weinberg CR, McConnaughey DR, Wilcox AJ. Length of human pregnancy and contributors to its natural variation. Human reproduction. 2013 Oct 1;28(10):2848-55.
18. Ferrari N, Joisten C. Impact of physical activity on course and outcome of pregnancy from pre-to postnatal. European journal of clinical nutrition. 2021 Dec;75(12):1698-709.
19. Wang Y, Ashokan K. Physical exercise: An overview of benefits from psychological level to genetics and beyond. Frontiers in Physiology. 2021 Aug 12;12:731858.
20. World Health Organization. Physical activity. Accessed from: https://www.who.int/health-topics/physical-activity#tab=tab_1. Accessed on: 11/09/2023.
21. Metzger BE. Long-term outcomes in mothers diagnosed with gestational diabetes mellitus and their offspring. Clinical obstetrics and gynecology. 2007 Dec 1;50(4):972-9.
22. Chan CW, Au Yeung E, Law BM. Effectiveness of physical activity interventions on pregnancy-related outcomes among pregnant women: a systematic review. International journal of environmental research and public health. 2019 May;16(10):1840.
23. Thangaratinam S, Rogozińska E, Jolly K, Glinkowski S, Duda W, Borowiack E, Roseboom T, Tomlinson J, Walczak J, Kunz R, Mol BW. Interventions to reduce or prevent obesity in pregnant women: a systematic review. NIHR Health Technology Assessment programme: Executive Summaries. 2012.
24. Nascimento SL, Surita FG, Cecatti JG. Physical exercise during pregnancy: a systematic review.

Current Opinion in Obstetrics and Gynecology. 2012 Dec 1;24(6):387-94.

25. Shepherd E, Gomersall JC, Tieu J, Han S, Crowther CA, Middleton P. Combined diet and exercise interventions for preventing gestational diabetes mellitus. Cochrane Database of Systematic Reviews. 2017(11).
26. Haakstad LA, Bø K. Effect of regular exercise on prevention of excessive weight gain in pregnancy: a randomised controlled trial. The European Journal of Contraception & Reproductive Health Care. 2011 Apr 1;16(2):116-25.
27. Cooper DB, Yang L. Pregnancy And Exercise.2017. accessed from: https://www.betterhealth.vic.gov.au/health/healthyliving/pregnancy-and-exercise. Accessed on:11/09/2023.
28. Wilmot EG, Edwardson CL, Achana FA, Davies MJ, Gorely T, Gray LJ, Khunti K, Yates T, Biddle SJ. Sedentary time in adults and the association with diabetes, cardiovascular disease and death: systematic review and meta-analysis. Diabetologia. 2012 Nov;55(11):2895-905.
29. Fazzi C, Saunders DH, Linton K, Norman JE, Reynolds RM. Sedentary behaviours during pregnancy: a systematic review. International Journal of Behavioral Nutrition and Physical Activity. 2017 Dec;14(1):1-3.
30. Meander L, Lindqvist M, Mogren I, Sandlund J, West CE, Domellöf M. Physical activity and sedentary time during pregnancy and associations with maternal and fetalhealth outcomes: an epidemiological study. BMC pregnancy and childbirth. 2021 Dec;21:1-1.
31. Ruifrok AE, Althuizen E, Oostdam N, Van Mechelen W, Mol BW, De Groot CJ, Van Poppel MN. The relationship of objectively measured physical activity and sedentary behaviour with gestational weight gain and birth weight. Journal of pregnancy. 2014 Jan 1;2014.
32. Padmapriya N, Shen L, Soh SE, Shen Z, Kwek K, Godfrey KM, Gluckman PD, Chong YS, Saw SM, Müller-Riemenschneider F. Physical activity and sedentary behavior patterns before and during pregnancy in a multi-ethnic sample of Asian women in Singapore. Maternal and child health journal. 2015 Nov;19:2523-35.
33. Gaston A, Cramp A. Exercise during pregnancy: a review of patterns and determinants. Journal of science and medicine in sport. 2011 Jul 1;14(4):299-305.
34. Evenson KR, Savitz A, Huston SL. Leisure-time physical activity among pregnant women in the US. Paediatric and perinatal epidemiology. 2004 Nov;18(6):400-7.
35. Löf M. Physical activity pattern and activity energy expenditure in healthy pregnant and non-pregnant Swedish women. European journal of clinical nutrition. 2011 Dec;65(12):1295-301.
36. Wu WH, Meijer OG, Uegaki K, Mens JM, Van Dieen JH, Wuisman PI, Östgaard HC. Pregnancy-related pelvic girdle pain (PPP), I: Terminology, clinical presentation, and prevalence. European Spine Journal. 2004 Nov;13:575-89.
37. Littleton HL, Breitkopf CR, Berenson AB. Correlates of anxiety symptoms during pregnancy and association with perinatal outcomes: a meta-analysis. American journal of obstetrics and gynecology. 2007 May 1;196(5):424-32.
38. Kominiarek MA, Peaceman AM. Gestational weight gain. American journal of obstetrics and gynecology. 2017 Dec 1;217(6):642-51.
39. Lardon E, St-Laurent A, Babineau V, Descarreaux M, Ruchat SM. Lumbopelvic pain, anxiety, physical activity and mode of conception: a prospective cohort study of pregnant women. BMJ open. 2018 Nov 1;8(11):e022508.
40. De Wit L, Jelsma JG, van Poppel MN, Bogaerts A, Simmons D, Desoye G, Corcoy R, Kautzky-Willer A, Harreiter J, van Assche A, Devlieger R. Physical activity, depressed mood and pregnancy worries in European obese pregnant women: results from the DALI study. BMC pregnancy and childbirth. 2015 Dec;15(1):1-0.
41. Evenson KR, Moos MK, Carrier K, Siega-Riz AM. Perceived barriers to physical activity among pregnant women. Maternal and child health journal. 2009 May;13:364-75.
42. Zhang Y, Dong S, Zuo J, Hu X, Zhang H, Zhao Y. Physical activity level of urban pregnant women in Tianjin, China: a cross-sectional study. PloS one. 2014 Oct 6;9(10):e109624.
43. Lee DT, Ngai IS, Ng MM, Lok IH, Yip AS, Chung TK. Antenatal taboos among Chinese women in Hong Kong. Midwifery. 2009 Apr 1;25(2):104-13.
44. Phelan S. Pregnancy: a "teachable moment" for weight control and obesity prevention. American journal of obstetrics and gynecology. 2010 Feb 1;202(2):135-e1.
45. Tremblay MS, Aubert S, Barnes JD, Saunders TJ, Carson V, Latimer-Cheung AE, Chastin SF, Altenburg TM, Chinapaw MJ. Sedentary behavior research network (SBRN)–terminology consensus project process and outcome. International journal of

behavioral nutrition and physical activity. 2017 Dec;14:1-7.

46. Biswas A, Oh PI, Faulkner GE, Bajaj RR, Silver MA, Mitchell MS, Alter DA. Sedentary time and its association with risk for disease incidence, mortality, and hospitalization in adults: a systematic review and meta-analysis. Annals of internal medicine. 2015 Jan 20;162(2):123-32.
47. Grøntved A, Hu FB. Television viewing and risk of type 2 diabetes, cardiovascular disease, and all-cause mortality: a meta-analysis. Jama. 2011 Jun 15;305(23):2448-55.
48. Young DR, Hivert MF, Alhassan S, Camhi SM, Ferguson JF, Katzmarzyk PT, Lewis CE, Owen N, Perry CK, Siddique J, Yong CM. Sedentary behavior and cardiovascular morbidity and mortality: a science advisory from the American Heart Association. Circulation. 2016 Sep 27;134(13):e262-79.
49. Garber CE, Blissmer B, Deschenes MR, Franklin BA, Lamonte MJ, Lee IM, Nieman DC, Swain DP. American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. Medicine and science in sports and exercise. 2011 Jul 1;43(7):1334-59.
50. Di Fabio DR, Blomme CK, Smith KM, Welk GJ, Campbell CG. Adherence to physical activity guidelines in mid-pregnancy does not reduce sedentary time: an observational study. International Journal of Behavioral Nutrition and Physical Activity. 2015 Dec;12(1):1-8.
51. Matthews CE, Chen KY, Freedson PS, Buchowski MS, Beech BM, Pate RR, Troiano RP. Amount of time spent in sedentary behaviors in the United States, 2003–2004. American journal of epidemiology. 2008 Apr 1;167(7):875-81.
52. Zhang C, Solomon CG, Manson JE, Hu FB. A prospective study of pregravid physical activity and sedentary behaviors in relation to the risk for gestational diabetes mellitus. Archives of internal medicine. 2006 Mar 13;166(5):543-8.
53. Alberico S, Montico M, Barresi V, Monasta L, Businelli C, Soini V, Erenbourg A, Ronfani L, Maso G, Multicentre Study Group on Mode of Delivery in Friuli Venezia Giulia. The role of gestational diabetes, pre-pregnancy body mass index and gestational weight gain on the risk of newborn macrosomia: results from a prospective multicentre study. BMC pregnancy and childbirth. 2014 Dec;14:1-8.
54. Healy GN, Dunstan DW, Salmon JO, Shaw JE, Zimmet PZ, Owen N. Television time and continuous metabolic risk in physically active adults. Medicine & Science in Sports & Exercise. 2008 Apr 1;40(4):639-45.
55. Fowden AL, Ward JW, Forhead AJ. Control of fetal metabolism: relevance to developmental origins of health and disease. Developmental origins of health and disease. 2006:143-58.
56. Eriksson J, Forsen T, Tuomilehto J, Osmond C, Barker D. Size at birth, childhood growth and obesity in adult life. International journal of obesity. 2001 May;25(5):735-40.
57. Santos MS, Joles JA. Early determinants of cardiovascular disease. Best practice & research Clinical endocrinology & metabolism. 2012 Oct 1;26(5):581-97.
58. Oken E, Gillman MW. Fetal origins of obesity. Obesity research. 2003 Apr;11(4):496-506.
59. Gampel SB, Nomura Y. Short and long-term effects of compromised birth weight, head circumference, and Apgar scores on neuropsychological development. Journal of psychological abnormalities in children. 2014;3(3).
60. Both MI, Overvest MA, Wildhagen MF, Golding J, Wildschut HI. The association of daily physical activity and birth outcome: a population-based cohort study. European Journal of Epidemiology. 2010 Jun;25:421-9.
61. Takito MY, Benício MH. Physical activity during pregnancy and fetal outcomes: a case-control study. Revista de saudepublica. 2010;44:90-101.
62. Hayes L, Bell R, Robson S, Poston L, UPBEAT Consortium. Association between physical activity in obese pregnant women and pregnancy outcomes: the UPBEAT pilot study. Annals of nutrition and metabolism. 2014 Oct 2;64(3-4):239-46.
63. Dwarkanath P, Muthayya S, Vaz M, Thomas T, Mhaskar A, Mhaskar R, Thomas A, Bhat S, Kurpad A. The relationship between maternal physical activity during pregnancy and birth weight. Asia Pacific journal of clinical nutrition. 2007 Dec 1;16(4).
64. Hoeger WW, Hoeger SA. Principles and labs for fitness and wellness. Cengage Learning; 2015.
65. Grannis CJ. The ideal physical therapist as perceived by the elderly patient. Physical Therapy. 1981 Apr 1;61(4):479-86.
66. Artal R, O'Toole M. Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period.

British journal of sports medicine. 2003 Feb 1;37(1):6-12.

67. Streuling I, Beyerlein A, Rosenfeld E, Hofmann H, Schulz T, Von Kries R. Physical activity and gestational weight gain: a meta-analysis of intervention trials. BJOG: An International Journal of Obstetrics & Gynaecology. 2011 Feb;118(3):278-84.
68. Dempsey JC, Butler CL, Sorensen TK, Lee IM, Thompson ML, Miller RS, Frederick IO, Williams MA. A case-control study of maternal recreational physical activity and risk of gestational diabetes mellitus. Diabetes research and clinical practice. 2004 Nov 1;66(2):203-15.
69. Ried-Larsen M, Grøntved A, Østergaard L, Cooper AR, Froberg K, Andersen LB, Møller NC. Associations between bicycling and carotid arterial stiffness in adolescents: The European Youth Hearts Study. Scandinavian Journal of Medicine & Science in Sports. 2015 Oct;25(5):661-9.
70. Han S, Middleton P, Crowther CA. Exercise for pregnant women to prevent gestational diabetes mellitus. Cochrane Database of Systematic Reviews. 2012(7).
71. Evenson KR, Barakat R, Brown WJ, Dargent-Molina P, Haruna M, Mikkelsen EM, Mottola MF, Owe KM, Rousham EK, Yeo S. Guidelines for physical activity during pregnancy: comparisons from around the world. American journal of lifestyle medicine. 2014 Mar;8(2):102-21.
72. Physical Activity Readiness Medical Examination. 2002. Accessed from: https://www.chp.gov.hk/archive/epp/files/PARmed-X.pdf. Accessed on: 06/10/2023.
73. WHOQOL: Measuring Quality of Life. Accessed from: https://www.who.int/tools/whoqol/whoqol-bref. Accessed on: 06/10/2023.
74. Physiopedia. Outcome measures. Accessed from:https://www.physio-pedia.com/Outcome_Measures. Accessed on: 06/10/2023.
75. da Silva SG, Hallal PC, Domingues MR, Bertoldi AD, Silveira MF, Bassani D, da Silva IC, da Silva BG, Coll CD, Evenson K. A randomized controlled trial of exercise during pregnancy on maternal and neonatal outcomes: results from the PAMELA study. International Journal of Behavioral Nutrition and Physical Activity. 2017 Dec;14(1):1-1.
76. Bastiaenen CH, de Bie RA, Wolters PM, Vlaeyen JW, Leffers P, Stelma F, Bastiaanssen JM, Essed GG, van den Brandt PA. Effectiveness of a tailor-made intervention for pregnancy-related pelvic girdle and/or low back pain after delivery: short-term results of a randomized clinical trial [ISRCTN08477490]. BMC musculoskeletal disorders. 2006 Dec;7:1-3.
77. Jackson ML, Rosier MJ, Walkley JW. Development of a scale to measure discomfort during pregnancy. Journal of Psychosomatic Obstetrics &Gynecology. 1996 Jan 1;17(2):85-92.
78. Chasan-Taber L, Schmidt MD, Roberts DE, Hosmer DA, Markenson GL, Freedson PS. Development and validation of a pregnancy physical activity questionnaire. Medicine & Science in Sports & Exercise. 2004 Oct 1;36(10):1750-60.
79. Salvesen KÅ, Mørkved S. Randomised controlled trial of pelvic floor muscle training during pregnancy. Bmj. 2004 Aug 12;329(7462):378-80.
80. Price BB, Amini SB, Kappeler K. Exercise in pregnancy: effect on fitness and obstetric outcomes—a randomized trial. Medicine & Science in Sports & Exercise. 2012 Dec 1;44(12):2263-9.
81. Cohen TR, Plourde H, Koski KG. Use of the Pregnancy Physical Activity Questionnaire (PPAQ) to identify behaviors associated with appropriate gestational weight gain during pregnancy. Journal of Physical Activity and Health. 2013 Sep 1;10(7):1000-7.
82. Sarfraz M, Islami D, Hameed U, Hasan Danish S, Ahmad F. Role of Physical Therapy in antenatal care as perceived by the clients-a cross-sectional survey on pregnant females attending antenatal OPD. Pakistan Journal of Medicine and Dentistry. 2013;1(01):34-46.
83. Bergström M, Rudman A, Waldenström U, Kieler H. Fear of childbirth in expectant fathers, subsequent childbirth experience and impact of antenatal education: subanalysis of results from a randomized controlled trial. Actaobstetricia et gynecologicaScandinavica. 2013 Aug;92(8):967-73.
84. Sharma M, Branscum P. Yoga interventions in pregnancy: a qualitative review. The Journal of Alternative and Complementary Medicine. 2015 Apr 1;21(4):208-16.
85. Bisson M, Alméras N, Dufresne SS, Robitaille J, Rhéaume C, Bujold E, Frenette J, Tremblay A, Marc I. A 12-week exercise program for pregnant women with obesity to improve physical activity levels: an open randomized preliminary study. PLoS One. 2015 Sep 16;10(9):e0137742.
86. Gehan AA, Khadiga SA, Amir GA, Eman A. Efficacy of antenatal exercises on maternal and neonatal outcomes in elderly primigravida. Kasr Al Ainy Medical Journal. 2015 Sep 1;21(3):109.

87. Bahadoran P, Mohamadirizi S. Relationship between physical activity and quality of life in pregnant women. Iranian journal of nursing and midwifery research. 2015 Mar;20(2):282.
88. Çırak Y, Yılmaz GD, Demir YP, Dalkılınç M, Yaman S. Pregnancy physical activity questionnaire (PPAQ): reliability and validity of Turkish version. Journal of physical therapy science. 2015;27(12):3703-9.
89. Miquelutti MA, Cecatti JG, Makuch MY. Developing strategies to be added to the protocol for antenatal care: an exercise and birth preparation program. Clinics. 2015 Apr 1;70(4):231-6.
90. Toosi M, Akbarzadeh M. The effect of aerobic exercises on maternal outcomes: a randomized controlled clinical trial. Women's Health Bulletin. 2016 Oct 1;3(4):1-8.
91. Schuster S, ŠklempeKokić I, Sindik J. Measuring physical activity in pregnancy using questionnaires: a meta-analysis. ActaClinicaCroatica. 2016 Nov 9;55(3.):440-51.
92. BN PK, Shetty H, Biliangady H, Kumar D. Efficacy of Yoga On Low Back Pain and Disability in Primi Gravidas. International Journal of Physiotherapy. 2016 Apr 8:182-5.
93. Gustafsson MK, Stafne SN, Romundstad PR, Mørkved S, Salvesen KÅ, Helvik AS. The effects of an exercise programme during pregnancy on health-related quality of life in pregnant women: a Norwegian randomised controlled trial. BJOG: An International Journal of Obstetrics & Gynaecology. 2016 Jun;123(7):1152-60.
94. Krzepota J, Sadowska D, Sempolska K, Pelczar M. Measuring physical activity during pregnancy-Cultural adaptation of the Pregnancy Physical Activity Questionnaire (PPAQ) and assessment of its reliability in Polish conditions. Annals of Agricultural and Environmental Medicine. 2017;24(4).
95. Sattler MC, Jaunig J, Watson ED, van Poppel MN, Mokkink LB, Terwee CB, Dietz P. Physical activity questionnaires for pregnancy: a systematic review of measurement properties. Sports Medicine. 2018 Oct;48:2317-46.
96. Mazúchová L, Kelčíková S, Dubovická Z. Measuring women's quality of life during pregnancy. Kontakt. 2018 Mar 1;20(1):e31-6.
97. Nasiri S, Akbari H, Tagharrobi L, Tabatabaee AS. The effect of progressive muscle relaxation and guided imagery on stress, anxiety, and depression of pregnant women referred to health centers. Journal of education and health promotion. 2018;7.
98. Stoll K, Swift EM, Fairbrother N, Nethery E, Janssen P. A systematic review of nonpharmacological prenatal interventions for pregnancy-specific anxiety and fear of childbirth. Birth. 2018 Mar;45(1):7-18.
99. Badon SE, Littman AJ, Chan KC, Williams MA, Enquobahrie DA. Maternal sedentary behavior during pre-pregnancy and early pregnancy and mean offspring birth size: A cohort study. BMC pregnancy and childbirth. 2018 Dec;18(1):1-9.
100. Vallim AL, Osis MJ, Cecatti JG, Baciuk EP, Silveira C, Cavalcante SR. Waterexercises and quality of life during pregnancy. Reprod Health 2011;8:14.
101. Kolu P, Raitanen J, Luoto R. Physical activity and health-related quality of life during pregnancy: a secondary analysis of a cluster-randomised trial. Matern ChildHealth J 2014;18:2098–105.
102. Chang SR, Chen KH, Lin MI, Lin HH, Huang LH, Lin WA. A repeated measuresstudy of changes in health-related quality of life during pregnancy and the relationshipwith obstetric factors. J AdvNurs2014;70:2245–56.
103. Nascimento S, Surita F, Parpinelli M, Siani S, Pinto ESJ. The effect of an antenatal physical exercise programme on maternal/perinatal outcomes and quality of life in overweight and obese pregnant women: a randomised clinical trial. BJOG 2011; 118:1455–63.
104. Kazemi F, Nahidi F, Kariman N. Exploring factors behind pregnant women's qualityof life in Iran: a qualitative study. Electron Physician 2017;9:5991–6001.
105. Lau Y, Htun TP, Lim PI, et al. Breastfeeding attitude, health-related quality of lifeand maternal obesity among multi-ethnic pregnant women: a multi-group structuralequation approach. Int J Nurs Stud 2017;67:71–82.
106. Effati-Daryani F, Mirghafourvand M, Mohammad-Alizadeh-Charandabi S, ShiriSarand F, Zarei S. Sleep quality and its relationship with quality of life in Iranianpregnant women. Int J NursPract 2017;23. Epub 2017 Jan 25.
107. Glover V. Maternal depression, anxiety and stress during pregnancy and childoutcome; what needs to be done. Best Pract Res ClinObstetGynaecol2014;28:25–35.
108. ACOG Committee Opinion No. 650. Physical activity and exercise duringpregnancy and the postpartum period. ObstetGynecol 2015;126:e135–42.
109. Piercy KL, Troiano RP, Ballard RM, et al. The physical activity guidelines forAmericans. JAMA 2018;320:2020–8.
110. O'Connor PJ, Poudevigne MS, Johnson KE, Brito de Araujo J, Ward-Ritacco CL.Effects of resistance training on fatigue-related domains of quality of life

and moodduring pregnancy: a randomized trial in pregnant women with increased risk of backpain. Psychosom Med 2018;80:327–32.

111. Seneviratne SN, Jiang Y, Derraik JGB, et al. Effects of antenatal exercise inoverweight and obese pregnant women on maternal and perinatal outcomes: arandomised controlled trial. BJOG 2016;123:588–97.
112. Montoya Arizabaleta AV, Orozco Buitrago L, Cecilia Aguilar de Plata A,MosqueraEscudero M, Ramirez-Velez R. Aerobic exercise during pregnancy improveshealth-related quality of life: a randomised trial. J Physiother2010;56:253–8.
113. Akmese Z, Oran N. Effects of progressive muscle relaxation exercises accompanied by music on low back pain and quality of life during pregnancy. JMidwifery Women's Health 2014;59:503–9.
114. Petrov FK, Glantz A, Fagevik OM. The efficacy of moderate-to-vigorous resistance exercise during pregnancy: a randomized controlled trial. ActaObstetGynecolScand2014;94:35–42.
115. Haakstad L, Torset B, Bø K. What is the effect of regular group exercise onmaternal psychological outcomes and common pregnancy complaints? An assessorblinded RCT. Midwifery 2016;32:81–6.
116. Watelain E, Pinti A, Doya R, Garnier C, Toumi H, Boudet S. Benefits of physicalactivities centered on the trunk for pregnant women. Phys Sportsmed2017;45:293–302.
117. Rakhshani A, Maharana S, Raghuram N, Nagendra H, Venkatram P. Effects ofintegrated yoga on quality of life and interpersonal relationship of pregnant women.Qual Life Res 2010;19:1447–55.
118. Claesson I-M, Klein S, Sydsjo G, Josefsson A. Physical activity and psychologicalwell-being in obese pregnant and postpartum women attending a weight-gain restrictionprogramme. Midwifery 2014;30:11–6