

Effectiveness Of Structured Antenatal Physiotherapy Module During Second Trimester Of Pregnancy In Primigravida Women- Randomised Controlled Trial

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Abstract

Objective: This randomized controlled trial aimed to evaluate the effectiveness of a structured antenatal physiotherapy module during the second trimester of pregnancy in primigravida women. Conducted over four years at the Department of Obstetrics and Gynaecology, KIMSDU, the study involved 108 healthy primigravida women, aged 20-29 years, with uncomplicated singleton pregnancies and gestational ages between 14-24 weeks. Participants were randomly assigned to two groups of 54 each, with informed consent obtained from all subjects.

Method: Group A received standard antenatal care, which included endurance training through walking, mild stretching exercises for flexibility, Kegel exercises for pelvic floor strengthening, progressive muscular relaxation for relaxation, and ergonomic advice on back care, posture, and lifting techniques. Group B received the same standard antenatal care combined with a structured antenatal physiotherapy module. This module incorporated specific yoga postures (e.g., Janu Sirasana, Baddha Konasana), additional strengthening exercises using light weights, and Pilates exercises aimed at core stability and flexibility.

Primary Outcome: Primary outcomes measured were maternal comfort, reduction of pregnancy-related discomforts, and overall physical fitness levels. Secondary outcomes included adherence to exercise protocols, maternal satisfaction, and potential adverse effects. Data were collected through standardized questionnaires and physical assessments at baseline, mid-intervention, and post-intervention.

Results indicated that the structured antenatal physiotherapy module significantly improved maternal comfort and physical fitness compared to the conventional physiotherapy exercises alone. Participants in Group B reported lower levels of back pain and higher overall satisfaction with their physical well-being. Adherence to the structured program was higher, and no significant adverse effects were reported.

Keywords: Structured antenatal physiotherapy, second trimester, pregnancy, primigravida women, randomized controlled trial.

Introduction

Pregnancy represents a distinct and thrilling period in a woman's life, emphasizing her

remarkable capacity for creation and nurturing while serving as a connection to the future. During pregnancy, a woman must be responsible for safeguarding her future child's

health. The developing fetus relies entirely on the mother's well-being for all its requirements. [1, 2]

According to data from the Global Health Observatory provided by the World Health Organization, in 2015, approximately 830 women lost their lives daily due to complications arising from pregnancy and childbirth. The risk of maternal-related fatalities for a woman in a developing nation is approximately 33 times higher compared to a woman in a developed country.[3]

As per UNICEF, on a global scale, roughly 800 women pass away daily due to preventable issues associated with pregnancy and childbirth, with 20% of these cases occurring in India. Each year, it is estimated that 55,000 women in India lose their lives due to preventable pregnancy-related causes.[4]

International human rights law encompasses core commitments made by nations to ensure the survival of women and adolescent girls during pregnancy and childbirth as an integral part of their right to sexual and reproductive health, upholding their dignity.[5] The World Health Organization (WHO) envisions a world where "every expectant mother and newborn receives high-quality care throughout pregnancy, delivery, and the postnatal period".[6] Nevertheless, in 2015, an estimated 303,000 women and adolescent girls lost their lives due to complications related to pregnancy and childbirth.[7] The overwhelming majority of maternal deaths, about 99%, occur in resource-limited regions, and many of these fatalities are preventable.[3] Similarly, roughly 2.6 million babies were stillborn in 2015, primarily in low-resource areas.[8] Importantly, there is evidence that cost-effective interventions are available for the prevention and treatment of nearly all life-threatening maternal complications.[9] Optimally adapting and implementing existing research findings could alleviate nearly two-thirds of the global burden of maternal and neonatal health issues. However, adopting a human rights-centered perspective goes beyond merely preventing fatalities and illnesses; it entails promoting health and quality of life while upholding dignity and human rights. [10, 11]

Pregnancy and childbirth can lead to substantial life changes that impact the prior phases of physical and emotional adjustment for couples. It's common for women to undergo shifts in their experience of sexuality during this period. [12] During pregnancy, some women may experience myofascial pain

in areas such as the back, hips, or pelvis. Myofascial Pain and Dysfunction Syndrome (MPDS) is a condition characterized by the presence of trigger points, muscle pain, and restricted movement due to muscle and fascia (connective tissue) abnormalities. Antenatal physiotherapy may help alleviate these symptoms and improve overall comfort during pregnancy. [13]

Antenatal care (ANC) can be described as the healthcare provided by trained healthcare professionals to pregnant women and adolescent girls. Its primary goal is to optimize the health of both the mother and the baby throughout the pregnancy. ANC encompasses several key elements: identifying potential risks, preventing and managing pregnancy-related or concurrent illnesses, and providing health education and promotion. ANC serves to reduce maternal and perinatal morbidity and mortality by directly addressing and treating pregnancy-related complications. Additionally, it indirectly contributes by identifying women and girls at higher risk for labor and delivery complications, ensuring their timely referral to appropriate healthcare facilities when needed.[14]

Pregnancy involves numerous physical and physiological transformations, representing two pivotal milestones in a woman's life. Expectant mothers necessitate specific attention as pregnancy yields dual health advantages: one for the mother herself as a valued community member and another for the offspring she carries. The physiological adjustments during pregnancy develop gradually but ultimately impact all bodily systems. In addition to adapting to these physiological changes, expectant mothers also undergo psychological transformations, driven not only by the physiological shifts but also by the mounting responsibilities associated with welcoming a new and entirely reliant individual into the family.[15, 16] Pregnancy and its associated transformations represent a natural physiological response to fetal development. These changes arise due to a combination of factors, including hormonal fluctuations, an increase in overall blood volume, weight gain, and the expanding size of the fetus as pregnancy advances. These factors collectively exert physiological effects on the pregnant woman, impacting various bodily systems such as musculoskeletal, endocrine, reproductive, cardiovascular, respiratory, nervous, urinary, gastrointestinal, and immune systems, as well as inducing alterations in the skin and breasts. [17, 15]

Maintaining a healthy lifestyle that involves physical activity can bring about several beneficial outcomes for both the mother and child throughout and following pregnancy.[18] Frequent physical activity is widely recognized for its positive impacts on physical and mental well-being. The World Health Organization (WHO) advises that individuals aged 18–64 should aim for 150 minutes of moderate-intensity exercise or 75 minutes of vigorous-intensity physical activity each week.[19, 20] Inadequate physical activity levels have been identified as the fourth major contributor to global mortality, contributing to conditions like cardiovascular disease, stroke, and diabetes mellitus. Despite these recommendations, a local survey indicates that only 50.7% of males and 37.4% of females have achieved the higher level of physical activity suggested by the WHO.[21, 22] Physical activity, in particular, plays a crucial role in impacting body composition.[23, 24] Lifestyle adjustments involving both diet and exercise have been shown to reduce the risk of developing gestational diabetes mellitus (GDM) and excessive weight gain during pregnancy. Additionally, there is a lower likelihood of continued postnatal weight gain with such interventions.[25, 26]

There are several potential advantages for women who engage in physical activity during pregnancy, including enhanced weight management, mood improvement, and the preservation of fitness levels. Additionally, regular exercise during pregnancy can reduce the likelihood of experiencing pregnancy-related issues like pregnancy-induced hypertension and pre-eclampsia.[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 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 about the 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]

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.

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.

Pregnancy and birth outcomes

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 14 weeks- 24 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 includes 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, Pectorals Shoulder muscles Upper trapezius were given. For pelvic floor strengthening Kegel's exercise were given for both contracting and relaxing pelvic floor muscles, Lift & hold for 5-7 seconds repeat 10-15 times; 3 times a day. For relaxation, Progressive Muscular Relaxation technique- 5-7 minutes as a part of cool down. Visual imagery technique and 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.

Conventional antenatal care includes, Endurance Training: Aerobic Exercises: Walking for 20 minutes. Stretching Exercises- Warm Up, Deep Breathing Exercises and thoracic expansion exercises, Strengthening exercises: Isolated Pelvic floor exercises, Relaxation exercises: Progressive muscular relaxation technique- Cool down, Ergonomic advice: Posture awareness and back care.

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. then subjects were treated with JanuSirasana, BaddhaKonasana, JanuSirasana with rotation, Utthitatrikonasana, Parvatasana in Svastikasana, PashchimaNamaskarasana, Setubandhasana (2 positions- Floor, Chair), AdhoMukhaShavasana, Bharadvajasana, Shavasana. All exercises were done for 1 set of 5 repetitions, 3 days/week on alternate days. 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. All exercises were done for 1-2 sets of 10-20 repetitions, 4-5 days/week. Exercise protocol was divided into 3 visits For 1st visit 1 set of exercises was given, For 2nd & 3rd visits 2 sets of exercises were given for both group A and group B.

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	

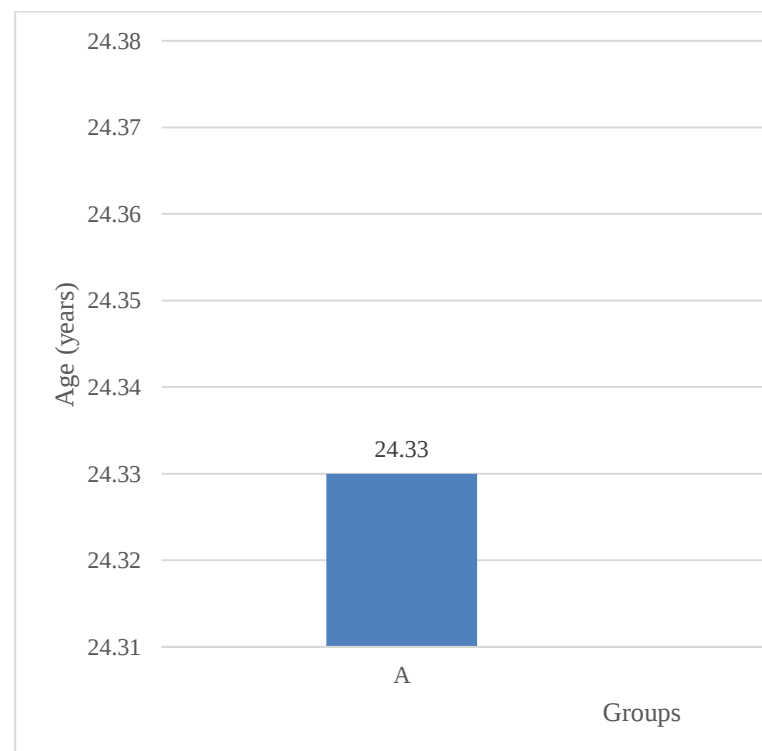


Figure 1.1. Comparison of mean age between groups

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.

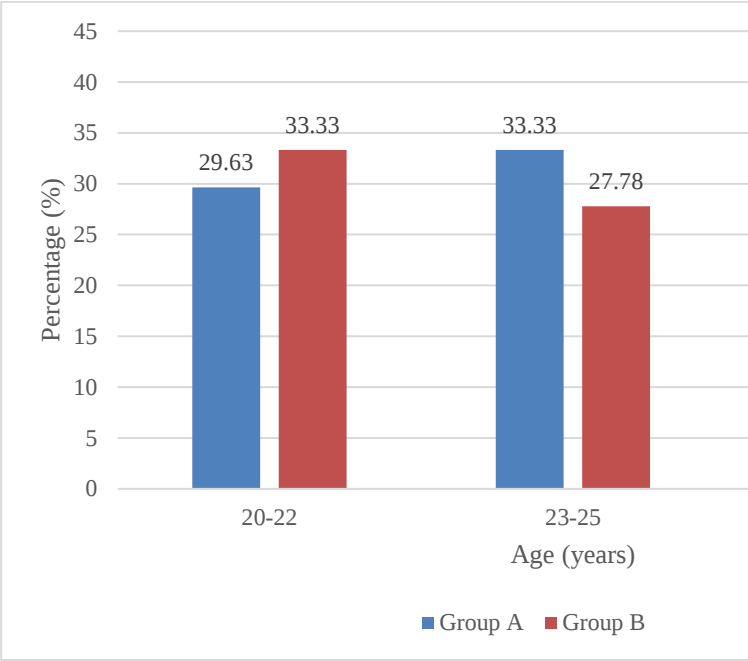


Figure 1.2. The distribution of subjects according to age categories

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

Assessment at 24 weeks of gestation

WHOQOL BREF

The mean score of WHOQOL BREF domains such as psychological, social relationship, and environment at 24 weeks of gestation was significantly better in group B subjects compared to group A subjects (Table 2).

Table 2. Comparison of WHOQOL BREF domains score at 24 weeks of gestation between groups

WHOQOL BREF domains	Group A (mean±SD)	Group B (mean±SD)	P value
Physical health	52.77±5.79	51.52±49.94	0.2275
Psychological	38.58±6.26	65.43±4.46	<0.0000
Social relationship	62.96±10.82	81.02±7.66	<0.0000
Environment	68.34±8.14	78.99±5.67	<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 24 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 3 and Figure 2.

Table 3. The distribution of subjects according to maternal physical discomfort at 24 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)	35.19 (19)	33.33 (18)	33.33 (18)	38.89 (21)
	Moderate	1.85 (1)	20.37 (11)	27.77 (15)	29.63 (16)	16.67 (9)
	Severe	0 (0)	0 (0)	18.52 (10)	1.85 (1)	0 (0)
	Absent	59.26 (32)	44.44 (24)	20.37 (11)	35.19 (19)	44.44 (24)
B	Mild	25.92 (14)	40.74 (22)	14.29 (22)	33.33 (18)	37.03 (20)
	Moderate	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Severe	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Absent	74.07 (40)	59.26 (32)	59.26 (32)	66.67 (36)	62.96 (34)

nt	08 (40)	26 (32)	6 (32)	7 (36)	6 (34)
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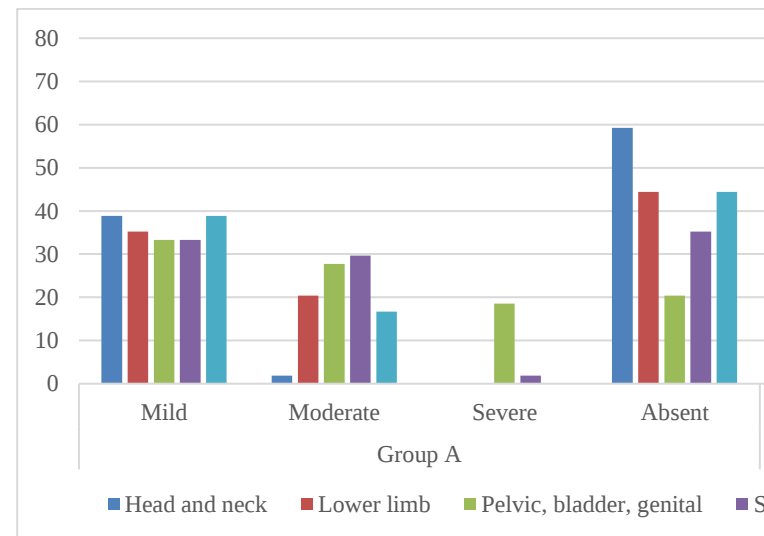


Figure 2. The distribution of subjects according to maternal physical discomfort at 24 weeks of gestation

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.

The present study was conducted to create a structured antenatal physiotherapy module and assess its impact on primigravida women. A total of 108 healthy primigravida women with uncomplicated pregnancies at 14 weeks, meeting the PARmed-X criteria, were enrolled in this randomized controlled trial. These participants were randomly assigned to two groups, with 54 women in each group. One group received conventional physiotherapy exercises (control group), while the other received the structured antenatal physiotherapy module (interventional group).

Initially, both groups of subjects underwent the exercise protocol from the 14th to the 24th week of gestation. After completing this period, participants were evaluated for WHOQOL BREF domains and maternal physical discomfort. The results indicated that, at the 24th week of gestation, subjects who received the structured antenatal physiotherapy module demonstrated significantly better mean scores in WHOQOL BREF domains related to psychological, social relationships, and environment compared to those who underwent conventional physiotherapy. Additionally, the incidence of moderate to severe maternal physical discomfort, including head and neck discomfort, lower limb discomfort, pelvic, bladder, and genital discomfort, stomach and bowel discomfort, and other discomfort, was higher in subjects who received conventional physiotherapy

compared to those who underwent 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 Akmes 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 results indicate that the structured physiotherapy modules implemented in Group B significantly improved various aspects of maternal well-being compared to Group A. At 24 weeks of gestation, Group B subjects exhibited better scores in WHOQOL BREF domains such as psychological, social relationship, and environment. Moreover, they experienced a lower proportion of moderate and severe physical discomfort, encompassing head and neck discomfort, lower limb discomfort, pelvic, bladder, genital discomfort, stomach, bowel discomfort, and other discomfort.

- Furthermore, 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.

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