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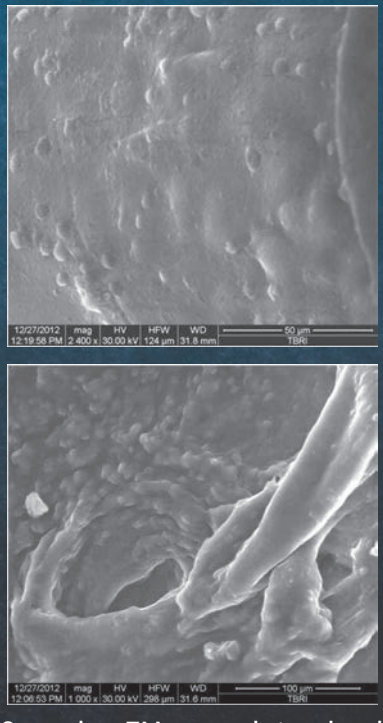

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Efficacy of antenatal exercises on maternal and neonatal outcomes in elderly primigravida

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Background and purpose
Elderly primigravida and their offspring have traditionally been considered to be at increased risk of adverse maternal and neonatal outcomes because of associated pregnancy and labor complications. This study was designed to examine the efficacy of antenatal exercises on maternal and neonatal outcomes in elderly primigravida.

Participants and methods
Sixty elderly primigravida women (age range: 35–40 years) at 14 weeks' gestation were divided randomly into two equal groups (A and B). Group A performed antenatal exercises for 6 months, whereas group B continued their lifestyle after receiving specific advice for each trimester. The exercise program parameters were based on the American College of Obstetricians and Gynecologists guidelines for exercise during pregnancy. Assessment of labor pain was performed using the Present Pain Intensity scale.

Results
Participants in group A showed a statistically significant difference in the intensity of labor pain when cervical dilatation was between 7 and 8 cm ($P = 0.000$), duration of first stage of labor ($P = 0.026$), and neonates' APGAR scores at the first and the fifth minute of life ($P = 0.000$) compared with participants in group B. There was no statistically significant difference between groups in the intensity of labor pain when cervical dilatation was between 3 and 5 cm ($P = 0.775$) and mode of delivery ($P = 0.630$).

Conclusion
Antenatal exercises are very effective in decreasing adverse effects and labor complications in elderly primigravida and their neonates.

Keywords:
antenatal exercises, elderly primigravida, neonates, pregnancy

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Introduction

With increasing incidence of infertility, and educational and career pursuits among women resulting in delayed child-bearing, more women are starting their obstetric career at the age 35 years and older. Elderly primigravida are generally believed to have decreased fertility and increased risk for adverse pregnancy outcomes [1]. With advanced maternal age, pregnancies are more prone to medical conditions that can adversely influence maternal health and that of their fetuses. Women aged 35 years and older have been reported to have twice the rates of ante partum hospitalization than their younger counterparts. Advanced maternal age is a risk indicator of several pregnancy and labor complications including spontaneous miscarriage, ectopic pregnancy, chromosomal abnormalities, degenerating fibroids, hypertensive disorders, gestational diabetes, prolonged labor, cephalopelvic disproportion necessitating operative delivery, low birth weight, ante partum and intrapartum fetal loss, and neonatal mortality [2]. In labor, they are also at an increased risk of cesarean section and instrumental vaginal delivery. The incidences of fetal distress and perinatal morbidity and mortality were significantly higher among the elderly primigravida than their younger counterparts [3].

Exercise is an integral part of normal life. Exercise in pregnancy could prevent and limit adverse maternal and fetal morbidities [4]. It promotes well-being and helps to remain healthy, helps prepares for labor, and enables speedy recovery after delivery. Exercise has been reported to reduce the occurrence of pre-eclampsia and may play a role in the primary prevention of developing gestational diabetes mellitus. Also, exercise is recommended for women during pregnancy to promote comfort, maintain muscle tone, promote a positive body image, increase awareness of good body mechanics, and prepare them for childbirth [5].

The involvement of women's health physiotherapists in antenatal care, through comprehensive knowledge

of potential obstetric complications, suggests that a physiotherapist should be a member of the multidisciplinary team, closely involved in the management of the elderly primigravida by providing instructions on antenatal exercises, providing advice on positions of ease during the different stages of labor, and teaching breathing awareness and relaxation to aid pain management. Physical therapy plays an important role in motivating the elderly primigravida to consider her wishes during labor and empower her to cope with the demands placed upon her, knowing that she has minimized the risk of medical intervention [6].

The need for this study developed from the lack of quantitative knowledge and information in the published studies on the effect of prenatal exercises on maternal and neonatal outcomes in this high-risk group. Therefore, this study was carried out to determine the efficacy of antenatal exercises on maternal and neonatal outcomes in elderly primigravida.

Participants and methods

Design

This study was designed as a clinical controlled trial that compared two groups: group A included exercise participants, who performed the exercise program starting from 14 weeks' gestation to avoid the risk of miscarriage [7], and group B included control participants, who continued their lifestyle after they were provided with specific advice for each trimester. The study design and sampling were carried out after obtaining approval from the hospital's ethical committee to carry out the study at the Physical Therapy Department of Bolak Abu-Ela General Hospital and an informed consent form was signed by each woman before participating in the study.

Sample

During the 1-year recruitment period from May 2013 to May 2014, 60 elderly primigravida women at 14 weeks' gestation diagnosed by an obstetrician and confirmed by ultrasonography (Medison Apparatus X6) were selected from the Outpatient Clinic of the Obstetric Department of Bolak Abu-Ela General Hospital to participate in the study. Their age ranged between 35 and 40 years and their BMI did not exceed 30 kg/m^2. Women with heart disease, lung disease, incompetent cervix or cervical cerclage, persistent first-trimester bleeding, intrauterine fetal growth retardation, hypertension, diabetes mellitus, severe anemia, thyroid disease, overweight or underweight, and those who smoked were excluded from the study.

Procedure

Participants were assigned randomly to two groups equal in number; each group included 30 pregnant women on the basis of a block-style randomization scheme [8]. Further screening of inclusion and exclusion criterion and demographic details were recorded, including age and BMI. All data and information of each participant in both groups were recorded in a recording data sheet. A full assessment of history was performed for each participant in both groups (A and B) before starting the study according to the items of the recording data sheet. All classes were held by the same physiotherapist. The exercise program parameters were based on the American College of Obstetricians and Gynecologists guidelines for exercise during pregnancy for sedentary women according to the FITT principle (frequency, intensity, time, and type), which included frequency = minimum of three times/week, intensity = moderately hard perceived exertion, time = 30 min/day, and type = low impact. Class size was limited to five participants to ensure their close supervision.

Each participant in group A was taught carefully during the exercise program. Antenatal exercises during the second trimester consisted of posture correction exercises from crock lying, supine, and sitting and standing positions (each exercise was maintained for 5 s and then the woman relaxed for 10 s and repeated this 10 times), diaphragmatic and lateral costal breathing exercises (the woman took a deep breath for 5 s and relaxed for 10 s and repeated this five times), general relaxation and teaching muscle sense (for 10 min), assuming a modified side lying position combined with natural and quiet breathing (for 5 min), and also advice on traveling, sexual intercourse, ideal posture for lifting objects, and showering. The total duration of each session in the second trimester was 30 min.

Antenatal exercises during the third trimester included pelvic floor exercises (including exercise for both pubovaginalis and puborectalis muscles), graduated abdominal exercises (including trunk lateral flexion, forward flexion, and rotation), and arm exercises (including static and active free arm exercises); each exercise mentioned above was maintained for 5 s and then the woman relaxed for 10 s and repeated this 10 times. Diversion drill training (for 3 min), positional education on cross-sitting and squatting positions (for 6 min), panting and breathing exercises, and perineal massage with aromatic relaxing oils were also performed. The total duration of each session in the second trimester was 30 min.

Each participant in group A performed the exercise sessions from 14 weeks' gestation till the date of

delivery. They attended the exercise program three times in the first week of the second trimester and the third trimester, and the program was continued through each trimester. Then, they attended the exercise program once weekly during the rest of the weeks of the second and third trimesters, whereas for the other days, they were instructed to perform the same exercises as in the program at home regularly throughout the study period. Compliance with home-based exercise was monitored by a self-recorded diary. Attendance of at least 20 out of 29 sessions was required to be defined as completion of the intervention.

In group B, the control participants continued their lifestyle and were provided specific advice for each trimester.

Outcome measures

Labor pain

Assessment of labor pain was performed for all participants in both groups A and B using the Present Pain Intensity scale on which pain intensity was scored as follows: no pain = 0, mild pain = 1, moderate pain = 2, severe pain = 3, and unbearable pain = 4. The Present Pain Intensity scale is reported to be a reliable outcome measure for pain evaluation [9]. Assessment of labor pain was performed when cervical dilatation was more than 3 cm and less than 5 cm and repeated when cervical dilatation was more than 7 cm and less than 8 cm.

Progress of labor

It was evaluated in both groups A and B by measuring the duration of first stage of labor, which is defined as the time interval when cervical dilatation was between 3 and 5 cm and full cervical dilatation 10 cm, and mode of delivery.

APGAR score

The APGAR score was used to assess the neonate's condition during the critical first and fifth minutes of life in both groups A and B. The APGAR score was determined by evaluating the newborn on five simple criteria. The five criteria (appearance, pulse, grimace, activity, respiration) are used as a mnemonic learning aid. The resulting APGAR score ranged from 0 to 10. Scores below 3 were generally considered critically low, 4–6 as fairly low, and higher than 7 as generally normal [10].

Results

All data were collected and statistically analyzed and presented as follows:

General characteristics of participants

Group A included 30 participants, and their mean age and first BMI were 36.56 years and 27.46 kg/m^2, respectively. Group B included 30 participants, and their mean age and first BMI were 36.18 years and 27.76 kg/m^2, respectively. With respect to all participants' age and first BMI, there was no statistically significant difference between both groups (P = 0.987 and 0.867, respectively) (Table 1).

Labor pain on the Present Pain Intensity scale

Labor pain was measured twice using the Present Pain Intensity scale: first, when cervical dilatation was more than 3 cm and less than 5 cm and then when cervical dilatation was more than 7 cm and less than 8 cm.

Labor pain between 3 and 5 cervical dilatation

The χ^2-test was used to determine whether there was a statistically significant difference between the two groups in the degree of labor pain; 72% of the participants in group A had mild labor pain, whereas in group B, 68.2% of participants had mild pain. It also showed that 28% of the participants in group A had moderate labor pain, whereas in group B, 31.8% of participants had moderate labor pain; thus, there was no statistically significant difference between the groups (χ^2 = 0.082 and P = 0.775) (Table 2 and Fig. 1).

Labor pain between 7 and 8 cm cervical dilatation

The χ^2-test was used to determine whether there was a statistically significant difference between the two groups in the degree of labor pain; 20% of the participants in group A had mild labor pain, whereas in group B, no participant had mild pain at this degree of cervical dilatation. It also showed that 72% of the participants in group A had moderate labor pain, whereas in group B, only 9.1% of the participants had moderate labor pain. In group B, 40.9% of the participants had severe labor pain, whereas in group A, 8% of the participants had severe labor pain. In group B, 50% of the participants had unbearable labor

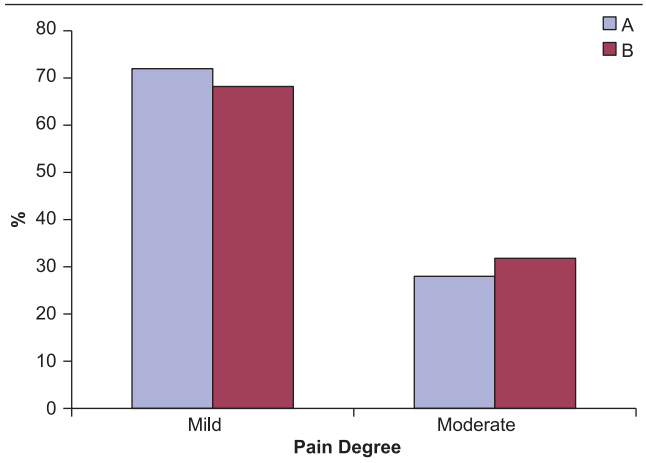
Table 1 Percentage of mode of delivery in both groups

Modes of delivery	Group A (%)	Group B (%)	χ^2-value	P-value
Normal	83.3	73.3	0.925	0.630
Cesarean	13.3	20		
Preterm	3.3	6.7		

Table 2 Percentage of labor pain intensity when cervical dilatation was more than 3 cm and less than 5 cm in both groups

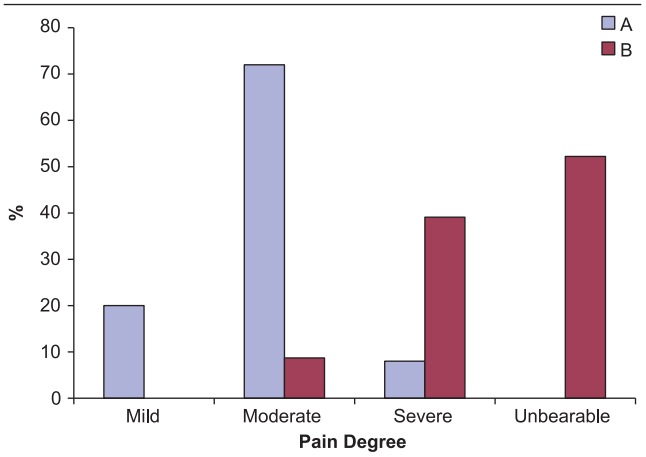
Pain at 3–5 cm	Group A (%)	Group B (%)	χ^2-value	P-value
Mild (1)	72	68.2	0.082	0.775
Moderate (2)	28	31.8		

Figure 1



Percentage of labor pain intensity when cervical dilatation was more than 3 cm and less than 5 cm in both groups.

Figure 2



Percentage of labor pain when cervical dilatation was more than 7 cm and less than 8 cm in both groups.

pain, whereas no participant had this degree of pain in group A; thus, there was a statistically significant difference between groups as labor pain was more intense among the participants of group B compared with the participants of group A (χ^2 = 33.198 and P = 0.000) (Table 3 and Fig. 2).

Table 3 Percentage of labor pain when cervical dilatation was more than 7 cm and less than 8 cm in both groups

Pain at 7–8 cm	Group A (%)	Group B (%)	χ^2-value	P-value
Mild (1)	20	0	33.198	0.000
Moderate (2)	72	9.1		
Severe (3)	8	40.9		
Unbearable (4)	0	50		

Progress of labor

Duration of the first stage of labor

This was evaluated in both groups A and B by measuring the duration of the first stage of labor using a nonparametric test, which was used to determine whether there was a statistically significant difference between the two groups in the duration of the first stage of labor. This test was carried out for participants who had normal labor in both groups; 25 out of 30 participants in group A had normal labor, whereas 22 out of 30 participants in group B had normal labor. Thus, there was a statistically significant difference between the mean values of the duration of the first stage of labor in group A (5.36 h) and its corresponding value in group B (6.04 h) (Z = 2.229 and P = 0.026) (Table 4).

Mode of delivery

The χ^2-test was used to determine whether there was a statistically significant difference between the two groups in the mode of delivery; 83.3% of the participants in group A had normal delivery, 13.3% had cesarean delivery, and 3.3% had preterm delivery. In group B, 73.3% of the participants had normal delivery, 20% had cesarean delivery, and 6.7% had preterm delivery; thus, there was no statistically significant difference between both groups in the mode of delivery (χ^2 = 0.925 and P = 0.630) (Table 1).

APGAR score

A nonparametric test was used to determine whether there was a statistically significant difference in the APGAR score values in the neonates of group A and neonates of group B at first and fifth minutes of life. This test was carried out for neonates of participants who had normal delivery in both groups. At the first minute of life, there was a statistically significant difference between the mean value of the APGAR score of group A (7.32) and group B (6.64) (Z = 3.965 and P = 0.000). Also, at the fifth minute of life, there was a statistically significant increase in the mean value of the APGAR score in group A (8.76) compared with its corresponding value in group B (8.05) (Z = 3.777 and P = 0.000) (Table 4).

Discussion

This study was carried out to determine the effect of antenatal exercises on maternal and neonatal outcomes in 60 elderly primigravida women; the results of this study showed a statistically significant difference in the effect of antenatal exercises in decreasing the intensity of labor pain during the first stage of labor and shortening the first stage of labor in the study group compared with the control group, whereas exercises had no effect on the mode of delivery in both groups. A statistically significant increase in the APGAR scores

Table 4 Mean values and statistical analysis of demographic data, duration of the first stage of labor, and APGAR scores in group A and group B

Variables	Group A				Group B				*Z*-value	*P*-value
	Mean	UCI	LCI	SE	Mean	UCI	LCI	SE		
Age (years)	36.56	37.20	35.92	0.311	36.18	36.83	35.53	0.313	0.017	0.987
BMI (kg/m^2)	27.46	27.90	27.02	0.212	27.76	28.27	27.25	0.245	0.168	0.867
Duration first stage (h)	5.36	5.77	4.94	0.199	6.04	6.36	5.72	0.153	2.229	0.026
APGAR first	7.32	7.52	7.12	0.095	6.64	6.85	6.42	0.105	3.965	0.000
APGAR fifth	8.76	8.94	8.58	0.087	8.05	8.33	7.76	0.139	3.777	0.000

was found at the critical first and fifth minute after labor, which favored neonates of group A than neonates of group B. The results of our study are in agreement with the review of Jones *et al*. [11], who found that antenatal exercises were both more effective and safer than conventional analgesic treatment, which had adverse effects on both the mother and the newborn, and that exercise could satisfy the pregnant female's need for alternative method to pharmacological and invasive methods of pain management commonly used during childbirth. Exercise is one of the most effective strategies for boosting serotonin levels; physical activity and deep breathing exercises may increase the firing rate of serotonin neurons in the brain, which may stimulate the production of mood-elevating chemicals. Aerobic exercises such as walking and swimming may have a more significant effect on serotonin levels, toning the muscles of the entire body, improving the general circulation, and lowering blood pressure during pregnancy and delivery. Our finding are also supported by those of Lawani *et al*. [12], who reported in their study a strong positive effect for antenatal exercises on health behaviors and a vaginal low-risk birth in elderly primigravida. Antenatal exercise is a form of nonpharmacological childbirth preparation method. It is considered both a physical and a psychological training method in accordance with the natural mechanisms of childbirth. Antenatal pelvic floor muscle training led to a lower rate of prolonged first stage of labor compared with women who received no training and also led to fewer delivery complications as poor tone may cause incontinence, lack of sensation during intercourse, unusual pain during birth, and prolonged first and second stages of labor. APGAR scores of infants born to exercising mothers were similar to or higher than those born to nonexercising mothers.

The results of our study were in agreement with those of some studies that found no relationship between mode of delivery and maternal activity during gestation. Other research, however, has found that participation in exercise during pregnancy is associated with lower rates of cesarean section and fewer complications. Women who exercised during pregnancy also report lower perceived exertion during labor than women who did not exercise [13]. The results from our study provide grounds for provision of advice as well as organizing exercise training groups for elderly primigravida and emphasizing the importance of a healthy diet and being physically active to gain the recommended weight during pregnancy and after giving birth and to prevent pregnancy and delivery complications in resource-limited countries.

Limitations

Despite the design of the present study (a randomized-controlled clinical trial), the small sample size recruited could be a potential limitation of the current study. On the basis of sample size estimation with the power of the study 1-B = 80% and to detect the effect size of d = 0.5 with a significance level of a less than 0.05, 50 participants were needed for each group. At present, it is not possible to study the effect of each antenatal exercise on common risks in elderly primigravida. The lack of an objective outcome measure such as measurement of pain intensity by VAS is another limitation of the present study.

Conclusion

Antenatal exercises are very effective in decreasing adverse effects and severe pregnancy and labor complications in elderly primigravida and their offspring. The results might provide the basis for clinical studies on the use of exercises in antenatal care for elderly primigravida.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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