

Effect of implementing the exercise program during the third trimester of pregnancy on course of labor and birth outcome

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Abstract: Exercise has become a fundamental aspect of woman's lives and an important constituent of antenatal care. It has a significant impact on a pregnant woman as well as on the course of childbirth. Thus the aim of this research was to investigate the effect of implementing the exercise program during the third trimester of pregnancy on course of labor and birth outcome. A Quasi- experimental research design was used. A purposive sample of 80 pregnant women was randomly divided into two equal groups, namely; study and control group (40) for each. The study was conducted at a private clinic as well as Walee- El-ahad private hospital. Tools: four tools were used: (1) Basic Data Structured interview Schedule, (2) Pelvic floor muscles strength test (3) Visual analog scale and (4) Maternal course of labor and its outcome assessment checklist. Results: revealed a statistically significant difference between both study and control groups in relation to course of labor and birth outcomes ($p=0.001$). The study concluded that pregnant women who practice exercise program during the third trimester of pregnancy exhibit normal course of labor and lower birth outcome risk than those who do not practice it over three months of intervention. It was recommended that In service training program should be carried out for nurses who are working in antenatal clinics to upgrade their knowledge regarding the important of exercises during pregnancy.

Keywords: Exercise, program, third trimester of pregnancy, course of labor, birth, outcome.

I. INTRODUCTION

Pregnancy is a normal physiological process that results in a series of both physiological and psychological changes in expectant mothers. Although it is a unique and powerful feminine experience. There are many physiological changes during pregnancy in order to nurture and accommodate the developing fetus. These changes begin after conception and affect every system in the body. Significant alterations are described in the cardiovascular, gastrointestinal, haematological, endocrine and musculoskeletal systems. Also the connective tissue of the ligaments and cartilage such as in symphysis pubis or ischiosacral junctions loosens. Accordingly Antenatal Care (ANC) is a recommended cornerstone interventions to reduce the effect of changes and alteration on the body systems [1].

Antenatal care is defined as monitoring and managing women during pregnancy to prevent complications and promote a healthy outcome for both the mother and expected baby. number of studies have identified lack of antenatal care as a risk factor for maternal mortality. ANC is provided to expectant mothers from time of conception until the beginning of labor. It is important in preventing, monitoring, early detecting, and treating health problems or complications. It also encompasses health education for the pregnant woman. One of the most important component of education is practicing of exercises. Exercise is an integral part of normal life. There are numerous health benefits associated with exercise during pregnancy such as could prevent and limit adverse maternal morbidities, maintenance of healthy weight gain, decreasing

gestational hypertension, reducing maternal back pain during pregnancy, shortening the duration of labor, and reducing the risk for cesarean section. whereas the benefits for fetus includes decreased resting fetal heart rate, improvement in the viability of the placenta and increased amniotic fluid levels.[2, 3].

There are many types of exercise during pregnancy that can be practiced by the pregnant woman such as breathing exercise, stretching exercise and pelvic floor muscle exercise (PFM). Breathing exercise the pregnant woman sit in fowler's position with place both hands over the rib cage then ask her to take a long, slow, deep breath through the nose as 'much as possible and to hold the breath for (2- 3) seconds then, exhale slowly through pursued-lips. likewise The pelvic floor muscles play an important role in maintaining adequate pelvic support, for example to the position and function of the bladder, uterus and rectum, and to enable urinary continence. During the practice of (PFM) the woman sits in a chair, stands or lie. slowly tight her PFM as hard as she can. Holds to the count of five and then relax.[4, 5].

Stretching exercises are include stretching and flexibility, especially the large muscle groups for about 15 minutes. These muscles include neck rolls, chest stretching & strengthening, gluteal strengthening, inner thigh stretching as well as abdominal stretching exercise. Lastly but not least to elucidate the effect of pregnancy on the different body system in general and on the pelvic floor muscles in specific, the practicing of exercise on a regular base during pregnancy would be required.[6].

II. BODY OF ARTICLE

1. AIM OF THE STUDY

This study aims to:

Investigate the effect of implementing the exercise program during the third trimester of pregnancy on course of labor and birth outcome.

RESEARCH HYPOTHESES

- 1- Pregnant women who practice exercise program during the third trimester of pregnancy exhibit normal course of labor than those who do not practice it.
- 2- Pregnant women who practice exercise program during the third trimester of pregnancy exhibit lower birth outcome risk than those who do not practice it.

2. MATERIALS AND METHOD

Materials

Research design:

A quasi experimental research design was used in this study.

Setting:

The study was conducted at two areas as the following: in private clinic as well as Walee- El-ahad private hospital. This clinic& hospital were specifically chosen because this research needs adherence and sustainability of the study subjects to antenatal exercises.

Subjects:

A purposive sample of 80 pregnant women was selected from the previously mentioned settings according to the following criteria:

- With normal course of pregnancy
- In the 3th trimester of pregnancy
- Multigravida & singleton pregnancy with cephalic presentation
- Free from any medical or gynecological problems
- Available at the time of data collection
- Willing to participate in the study

The sample size of pregnant women was estimated by using the Epi-Info 7 program, where the following parameters were applied:

- Population size = 1300/3 months
- Expected frequency = 50%
- Acceptable error = 10%
- Confidence coefficient = 95%
- Minimum sample size = 79

The selected subjects were assigned to either the control (40) or the study group (40).

- **Study group:** was instructed to practice three types of exercises; pelvic floor muscle exercises, breathing exercises & stretching exercises.
- **Control group:** was received only the routine antenatal care.

Tools:

Four tools were used to collect the necessary data in the current study:

Tool I: Tool- I : Basic Data Structured interview Schedule:

This tool was developed by the researcher to collect the necessary data from pregnant women. It includes four parts:

- Socio-demographic characteristics such as: age, religion, level of education; occupation; marital status; current residence; family type and income as well as crowding index.
- Reproductive history such as gravidity, parity, type of previous deliveries as well as complications of previous pregnancies and deliveries. Number of abortions, stillbirth and living children.
- History of current pregnancy such as ; whether it was planned or not, weeks of gestation; as well as number of antenatal visits, time of initial antenatal visit in addition to sex and birth order of the fetus.
- **Clinical assessment sheet:** It included baseline data such as vital signs, abdominal palpation for determination of fundal level, weeks of gestation, lie, position, presentation, attitude of fetus and fetal heart sound auscultation. Height, weight and body mass index (BMI).[7]

Tool II- Pelvic floor muscles strength test (PMST) or palpation test. It is a device for measuring pelvic floor muscle strength and endurance. The woman is kept in a gynecological position while a rubber coated transducer covered with a condom is introduced 2-3 cm into the vaginal introitus. Next, the transducer is inflated and the apparatus is set to 0. The patient is asked to inhale and perform maximum contraction of the pelvic floor muscles while exhaling which corresponds to the readings in the ammeter attached to the transducer. Below is a guide provided by the device manufacturer as a measure of strength and endurance (table 1).[8]

Table 1: Pelvic floor muscles strength test (PMST) or palpation test

| Strength | Endurance | |
|-------------|---------------------|-------------|
| 10 or under | 45 seconds or under | Weak |
| 10-20 | 45-90 seconds | Moderate |
| 20-30 | 90-135 | Normal |
| 30-40 | 135-180 | Strong |
| Over 40 | Over 180 | Very strong |

Tool III: Visual analog scale:

It was originally developed by Katz and Melzack [9], and then revised for its **reliability & validity** by Alghadir, et al. [10]. This tool was adopted & translated to Arabic language by the researcher. It was used by the researcher to determine the severity of labor pain before and after intervention. It is a self-reported 10 cm straight line which represents the pain intensity, the two opposite ends representing no pain to pain as bad as it could be in between these two phrases, words like mild pain, moderate pain, severe pain, very severe pain are assigned to each 2 cm distance respectively.

SCORE KEYS:

- 1 to 3= Mild pain
- 4 to 6= Moderate pain
- 7 to 9= Severe pain
- 10= Worst possible pain.

Tool IV: Maternal course of labor and its outcome assessment checklist:- it entailed two section

Section I: Maternal course of labor and its outcome assessment checklist, which involved mode of delivery, occurrence of perineal trauma and the level of pain as well as onset and duration of labor (duration of each stage and total labor duration).

Section II: Fetal course of labor and its outcome assessment checklist, which entailed presence of fetal distress, fetal problems, in addition to the first and fifth minute APGAR score.

METHOD

The study was conducted according to the following steps:

1. Approval from ethical committee, Faculty of Nursing Alexandria University was obtained.
2. Official letter from the faculty of nursing was submitted to the responsible authorities of the study settings to obtain their permission to conduct the study and collect data after explanation of research purpose.
3. **Tool development phase:**
 - After reviewing the recent relevant literature, tool (I, IV) were developed by the researcher.
 - Tools II & III were adopted, and tool III was translated into Arabic language and the necessary modifications were done.
 - Tools were validated by juries of (3) experts in the field. Their suggestions and recommendations were taken into consideration.
 - The reliability of the tools were tested using internal consistency test (Cronbach α).
4. The researcher trained how to demonstrate the three types of exercises; **pelvic floor muscle exercise, breathing exercise & stretching exercise** for a period of three weeks before researching by the supervisor through a training sessions.
5. A **pilot study** was carried out on 8 pregnant women to ensure the clarity and applicability of the tools, identify obstacles and problems that may be encountered as well as to estimate the time needed for data collection. Accordingly, the necessary modifications were made. Women participating in the pilot study were excluded from the study sample.

6. The study was conducted through the following phases:

I. Assessment phase:

- All pregnant women attended a private antenatal clinic were screened by an obstetrician to obtain the baseline data on abdominal palpation to determination the level of the fundal, lie, presentation, attitude of fetus and fetal heart sound. Additionally, pelvic floor muscle strength was assessed by obstetrician using tool II.
- The researcher then conducted individual interviews with the subjects of the study to collect basic data using (tool I&II).
- The first 40 pregnant women who fulfilled the inclusion criteria at private antenatal clinic were assigned into control group to avoid contamination of the control group.
- While, the second 40 pregnant women were assigned into experimental group. Then they were given an appropriate explanation about the purpose of the study, design, and subject's role. The explanation was done using power point presentation at the clinic for small group (5-10) women each time.

II. Development of third trimester exercise program sessions :

It aimed to improve subject's knowledge and performance regarding **pelvic floor muscle exercises**, **breathing exercise** as well as **stretching exercise after a thorough review of the literature**. It included two main parts :

- a) Theoretical part (didactic): It was included the definitions of PFME, **breathing exercise** as well as **stretching exercise**, types, indication, benefits, advantages and disadvantages of each type, precautions, steps and technique of application.
- b) Clinical part (Clinical training Environment): It was prepared by the researcher which included safe environment, birth ball, mattress and videos.

III. Implementation phase:

The studied group were assigned randomly into five subgroups according to the schedule of subjects, and each group contains approximately 8 subjects.

- 1- For the study group the training was implemented in 12 sessions, it was scheduled as: one session /week in the morning (1hours each).

In the **1st session**, all didactic content about types, indication, benefits, advantages and disadvantages, precautions will be frontolated in the introduction.

Sessions (2-5):-after introducing the study group to clinical training environment and resources available. A clinical section on precautions, steps and technique for PFME as well as a breathing exercise were presented as follows clinical part about precautions, steps and technique of PFME as well as breathing exercise were demonstrated as follows :

- a) **Related to pelvic floor muscle exercise**: the researcher instructed the pregnant woman to contract the pelvic floor muscles as an attempt to stop urine flow for three (3 seconds) and relax for another three seconds. Contract and relax 5 times, repeat this 5 times. Also the researcher instructed the pregnant woman to relax for an equal period of time holding the contraction.
 - b) **Related to breathing exercise**: the researcher instructed the women before practicing breathing exercise to sit in either fowler's or semi-fowler position with place both hands on the rib cage and then ask her to take a long, slow, deep breath through the nose as' much as "possible and to hold the breath for a period (2- 3) seconds then, exhale slowly through pursued-lips. Repeat the exercise 4 times,5 times daily.
- Then the trainees re-demonstrated the procedures using the available resources.
 - At the beginning of the next session, the previous practices were reviewed and the pregnant women questions were answered.

Session (6-12) :it included a clinical training about stretching exercise, steps and technique of application as follow :

- c) **Related to stretching exercise**: the researcher instructed the women about the 20 minutes of stretching exercise.
 - The exercise program consisted of:
 - 2-3 min for the warm-up.
 - 10–15 min for a sequence stretches of large skeletal muscle from the neck to the upper limbs, to the torso, and the lower limbs. Briefly, the 15 minutes of exercise included 7.5 minutes of upper body movements and 7.5 minutes of lower body movements.
 - 1–2 min for the cool-down.

Followed by demonstration and re-demonstrate by the study group.

For control group: was received only the routine antenatal care.

- After admission of mother in delivery ward, the study group was asked to perform the trained practices (breathing exercises) which learned in the sessions under the guidance of the researcher

IV. Evaluation phase:

- Two months after the implementation of exercise program the subjects were assessed for their physical condition and pelvic floor muscles strength using tool I part ' 5'&II.

- On admission at delivery ward the subjects were assessed by the researcher for their physical condition and pain intensity (during active phase of the first stage and second stage and third stage of labor) using tool I part ' 5'&III (Appendix IV). After delivery, course of labor and birth outcome were assessed for both Groups using tool IV.
- The program was started from 3-7-2020 until 2-10-2020.
- Handout about the selected antenatal exercise was distributed after implementation of the exercises training.

Ethical considerations: For each recruited subject the following issues were considered: securing the subject's informed written consent, keeping her privacy and right to withdrew at any time as well as assuring confidentiality of their data.

Statistical analysis: Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). Qualitative data were described using number and percent. Quantitative data were described using range (minimum and maximum), mean, standard deviation. Significance of the obtained results was judged at the 5% level.

3. RESULTS

Table (I): Number and percent distribution of the study subjects according to their Socio- demographic data.

| Q | Socio- demographic data | Study (n = 40) | | Control (n = 40) | | Test of Sig. | p |
|--------------------------------|-----------------------------|----------------|------|------------------|------|--------------------|-------------------|
| | | No. | % | No. | % | | |
| Socio- demographic data | | | | | | | |
| 1 | Age (years) | | | | | | |
| | 18 – <20 | 2 | 5.0 | 4 | 10.0 | $\chi^2=$ 0.898 | MC p= 0.670 |
| | 20 - <30 | 29 | 72.5 | 26 | 65.0 | | |
| | ≥30+ | 9 | 22.5 | 10 | 25.0 | | |
| | Min. – Max. | 18.0 – 38.0 | | 18.0 – 39.0 | | t=0.818 | 0.416 |
| | Mean ± SD. | 28.20 ± 4.50 | | 27.30 ± 5.31 | | | |
| 2 | Education level | | | | | | |
| | Illiterate / read and write | 9 | 22.5 | 13 | 32.5 | $\chi^2=$ 3.903 | MC p= 0.274 |
| | Primary and preparatory | 16 | 40.0 | 12 | 30.0 | | |
| | Secondary | 9 | 22.5 | 13 | 32.5 | | |
| | University | 6 | 15.0 | 2 | 5.0 | | |
| 3 | Occupation | | | | | | |
| | House wife | 11 | 27.5 | 5 | 12.5 | $\chi^2=$ 2.813 | 0.094 |
| | Work | 29 | 72.5 | 35 | 87.5 | | |
| 4 | Type of work | | | | | | |
| | Professional | 5 | 17.2 | 3 | 8.6 | $\chi^2=$ 2.976 | MC p= 0.246 |
| | Employee | 21 | 72.4 | 23 | 65.7 | | |
| | Worker | 3 | 10.3 | 9 | 57.7 | | |
| 5 | Residence | | | | | | |
| | Rural | 6 | 15.0 | 4 | 10.0 | $\chi^2=$ 0.457 | 0.499 |
| | Urban | 34 | 85.0 | 36 | 90.0 | | |
| 6 | Type of family | | | | | | |
| | Nuclear | 38 | 95.0 | 37 | 92.5 | $\chi^2=$ 0.213 | 1.000 |
| | Extended | 2 | 5.0 | 3 | 7.5 | | |
| | Crowding index | | | | | | |
| | Min. – Max. | 0.40 – 3.0 | | 1.0 – 3.0 | | t=1.012 | 0.316 |
| | Mean ± SD. | 1.52 ± 0.60 | | 1.63 ± 0.25 | | | |
| 8 | Family income/month | | | | | | |
| | More than enough | 37 | 92.5 | 36 | 90.0 | $\chi^2=$ 0.157 | 0.692 |
| | Just enough | 3 | 7.5 | 4 | 10.0 | | |
| 9 | Age at marriage | | | | | | |
| | Min. – Max. | 18.0 – 31.0 | | 18.0 – 33.0 | | t=1.630 | 0.107 |
| | Mean ± SD. | 24.83 ± 3.76 | | 23.32 ± 4.44 | | | |

χ^2 : Chi square test MC: Monte Carlo FE: Fisher Exact t: Student t-test

*: Statistically significant at $p \leq 0.05$

Table (I) indicates absence of any statistically significant differences between the study and control groups before intervention in relation to their age, level of education, occupation, type of work, residence, crowding index, monthly income, age at marriage, medical and surgical history. Specifically slightly less than three - quarters (72.5%) of the study group compared to 65% of the control group were aged from 20-<30 years. While, the least percentage of both groups were aged from 18-<20 years (5% and 10.0% respectively). Concerning their educational level 15% of the study group compared to only 5% of the control group had university education. The nuclear type of family was evident among close proportions of the study and control group (95% & 92.5 % respectively). Also the majority of the study and control groups (85% & 90% respectively) were form urban residence.

The same table presented that the minority of the study and control groups (27.5% and 12.5 %, respectively) were housewives. Regarding to monthly income the vast majority (92.5% and 90 %, respectively) of the study and control groups had more than enough monthly income. Mean age at marriage was evident in close proportion among the study and control groups (24.83 ± 3.76 and 23.32 ± 4.44) respectively.

Table (II): Number and percent distribution of the study subjects according to their Reproductive history of (n = 80).

| Q | Reproductive history | Study (n = 40) | | Control (n = 40) | | χ^2 | p |
|-----------|-------------------------------|----------------|------|------------------|-------|----------|-------------------|
| | | No. | % | No. | % | | |
| 13 | Gravidity | | | | | | |
| | 1 | 19 | 47.5 | 13 | 30.0 | 2.435 | MC p= 0.720 |
| | 2 | 12 | 30.0 | 17 | 42.5 | | |
| | ≥ 3 | 9 | 22.5 | 10 | 25.0 | | |
| 14 | Number of abortions | | | | | | |
| | 0 | 31 | 77.5 | 31 | 77.5 | 2.174 | MC p= 0.660 |
| | 1 | 8 | 20.0 | 6 | 15.0 | | |
| | 2 | 1 | 2.5 | 1 | 2.5 | | |
| | ≥ 3 | 0 | 0.0 | 2 | 5.0 | | |
| 15 | Parity | | | | | | |
| | 0 | 19 | 47.5 | 13 | 32.5 | 7.405 | MC p= 0.081 |
| | 1 | 16 | 40.0 | 17 | 42.5 | | |
| | 2 | 2 | 5.0 | 9 | 22.5 | | |
| | ≥3 | 3 | 7.5 | 1 | 2.5 | | |
| 16 | No. of stillbirth | | | | | | |
| | 0 | 39 | 97.5 | 40 | 100.0 | 1.013 | FE p= 1.000 |
| | 1 | 1 | 2.5 | 0 | 0.0 | | |
| 18 | No. of living children | | | | | | |
| | 0 | 28 | 70.0 | 24 | 60.0 | 4.795 | MC p= 0.101 |
| | 1 | 9 | 22.5 | 16 | 40.0 | | |
| | 2 | 1 | 2.5 | 0 | 0.0 | | |
| | 3 | 2 | 5.0 | 0 | 0.0 | | |
| 19 | Sex of living children | | | | | | |
| | Male | 7 | 38.9 | 11 | 39.3 | 0.481 | 0.786 |
| | Female | 5 | 27.8 | 10 | 35.7 | | |
| | Males and females | 6 | 33.3 | 7 | 25.0 | | |

χ^2 : Chi square test MC: Monte Carlo FE: Fisher Exact

*: Statistically significant at $p \leq 0.05$

Table (II) sheds the light upon the reproductive history among the study subjects. As regard to gravidity slightly more than one fifth (22.5%) of the study group compared to one- quarter (25%) of the control group had three time and more pregnancy. Also only (7.5% & 2.5% respectively) of the study and control groups were delivered three times and more. The

same table shows that the three- quarters 77.5% of both study and control group had no history of abortion. Almost all (97.5% & 100% respectively) of the study and control group had no history of stillbirth. Concerning the number of live children only (2.5%) of the study group versus none (0.0%) of the control group had two children. Regarding the sex of the live children, the male sex was observed among (38.9% and 39.3%, respectively) between the two groups with no statistically significant differences between them with respect to the previously mentioned items.

Table (III): Number & percent distribution of the studied subjects according to their history of current pregnancy (n = 80).

| Q | History of current pregnancy | Study (n = 40) | | Control (n = 40) | | Test of Sig. | p |
|-----------|---|----------------|-------|------------------|-------|----------------|-----------------------|
| | | No. | % | No. | % | | |
| 20 | Pregnancy was planned and wanted | | | | | | |
| | Planned | 37 | 92.5 | 34 | 85.0 | $\chi^2=1.127$ | ^{FE} p=0.481 |
| | Un Planned | 3 | 7.5 | 6 | 15.0 | | |
| 21 | Weeks of gestation | | | | | | |
| | Min. – Max. | 28.0 – 34.0 | | 28.0 – 38.0 | | t=0.744 | 0.459 |
| | Mean ± SD. | 31.35 ± 1.59 | | 31.67 ± 2.26 | | | |
| 22 | First visit during pregnancy | | | | | | |
| | First trimester | 32 | 80.0 | 33 | 82.5 | $\chi^2=0.082$ | 0.775 |
| | The second trimester | 8 | 20.0 | 7 | 17.5 | | |
| 23 | Follow-up visits | | | | | | |
| | Less than four times | 25 | 62.5 | 27 | 67.5 | $\chi^2=0.220$ | 0.639 |
| | Four times or more | 15 | 37.5 | 13 | 32.5 | | |
| 24 | Minor discomforts | | | | | | |
| | Yes | 40 | 100.0 | 40 | 100.0 | - | - |
| | No | 0 | 0.0 | 0 | 0.0 | | |
| 25 | Types of minor discomfort | | | | | | |
| | Nausea | 36 | 90.0 | 34 | 85.0 | $\chi^2=0.457$ | 0.499 |
| | Burning sensation in the stomach | 23 | 57.5 | 22 | 55.0 | $\chi^2=0.051$ | 0.822 |
| | Constipation | 18 | 45.0 | 10 | 25.0 | $\chi^2=3.516$ | 0.061 |
| | Back pain | 29 | 72.5 | 25 | 62.5 | $\chi^2=0.912$ | 0.340 |
| | Swollen feet | 25 | 62.5 | 19 | 47.5 | $\chi^2=1.818$ | 0.178 |

χ^2 : Chi square test MC: Monte Carlo FE: Fisher Exact t: Student t-test
 *: Statistically significant at $p \leq 0.05$

Table (III) displays that there are no statistically significant differences between the study group and the control group with regard to the following elements: the planned pregnancy status, weeks of pregnancy, time of the initial visit, the number of follow-up visits, the presence and type of minor inconveniences during pregnancy. Regarding current pregnancy history, the majority (92.5%, 85%, respectively) of the study and control group had planned and wanted pregnancy. The mean pregnancy weeks were evident in close proportions between the two study groups and the control group (31.35 ± 1.59 and 31.67 ± 2.26), respectively. The majority of the study group (80%) compared to (82.5%) of the control group started their initial visit during the first trimester of pregnancy. Additionally (62.5%) of the study group compared to approximately two-thirds (67.5%) of the control group had received less than four antenatal visits. All of both the study and control group had minor discomforts during their pregnancies.

Table (IV): The mean differences between the studied subjects according to their clinical assessment data (n = 80).

| Q | Items of clinical assessment of study subject | Study (n = 40) | | Control (n = 40) | | Test of Sig. | p |
|----------|---|----------------|----------|------------------|----------|--------------|-------|
| 1 | Weight (kg) | | | | | | |
| | Min. – Max. | 60.0 – 113.0 | | 61.0 – 115.0 | | | |
| | Mean ± SD. | 80.08 ± 12.68 | | 82.48 ± 12.0 | | t= 0.869 | 0.387 |
| 2 | Height (cm) | | | | | | |
| | Min. – Max. | 148.0 – 167.0 | | 150.0– 172.0 | | | |
| | Mean ± SD. | 159.93 ± 3.19 | | 161.05±5.10 | | t= 1.183 | 0.241 |
| 3 | BMI (kg/m²) | | | | | | |
| | Min. – Max. | 24.03 – 44.14 | | 21.11 – 46.66 | | | |
| | Mean ± SD. | 31.28 ± 4.68 | | 31.89±5.02 | | t= 0.560 | 0.577 |
| 7 | Vital signs | | | | | | |
| | Pulse | | | | | | |
| | Min. – Max. | 66.0 – 90.0 | | 60.0 – 88.0 | | | |
| | Mean ± SD. | 80.50 ± 4.88 | | 79.03 ± 6.04 | | t= 1.202 | 0.233 |
| | Blood pressure | | | | | | |
| | Systolic | | | | | | |
| | Min. – Max. | 110.0 – 124.0 | | 110.00 – 132.0 | | | |
| | Mean ± SD. | 114.15 ± 5.54 | | 116.60±7.25 | | t= 1.699 | 0.094 |
| | Diastolic | | | | | | |
| | Min. – Max. | 70.0 – 88.0 | | 68.0 – 90.0 | | | |
| | Mean ± SD. | 76.45 ± 4.97 | | 75.88 ± 5.10 | | t= 0.511 | 0.611 |
| | Temperature | | | | | | |
| | Min. – Max. | 35.50 – 37.50 | | 36.50 – 37.40 | | | |
| | Mean ± SD. | 36.77 ± 0.43 | | 36.86 ± 0.24 | | t= 1.165 | 0.249 |
| | Respiratory | | | | | | |
| | Min. – Max. | 15.0 – 18.0 | | 14.0 – 18.0 | | | |
| | Mean ± SD. | 17.30 ± 0.85 | | 16.85 ± 1.41 | | t= 1.730 | 0.088 |
| | Leopold's maneuvers | | | | | | |
| 4 | Fetal lie | No. | % | No. | % | | |
| | Longitudinal | 40 | 100.0 | 40 | 100.0 | – | – |
| 5 | Fetal presentation | | | | | | |
| | Cephalic presentation | 0 | 0.0 | 0 | 0.0 | | |
| | Cephalic vertex | 40 | 100.0 | 40 | 100.0 | - | - |
| | Cephalic presentation (vertex) | 0 | 00 | 0 | 0.0 | | |
| 6 | Fetal attitude | | | | | | |
| | Complete flexion | 40 | 100.0 | 40 | 100.0 | – | – |
| 8 | Fetal position : | | | | | | |
| | LOA | 20 | 50.0 | 20 | 50.0 | $\chi^2=$ | 1.000 |
| | ROA | 20 | 50.0 | 20 | 50.0 | 0.00 | |
| 9 | Fetal heartbeat, pulse / minute | | | | | | |
| | Min. – Max. | 120.0 – 140.0 | | 120.0 – 156.0 | | | |
| | Mean ± SD. | 132.00 ± 7.58 | | 134.7 ± 8.53 | | t= 1.497 | 0.139 |

χ^2 : Chi square test MC: Monte Carlo FE: Fisher Exact t: Student t-test

*: Statistically significant at $p \leq 0.05$

Table (IV) illustrate the mean differences between the studied subjects according to their clinical assessment data, there is a decrease in the mean percent of weight, height and body mass index among the study group (80.08 ± 12.68 , $159.93 \pm$

3.19 & 31.28 ± 4.68) compared to the control group (84.05 ± 12.65, 161.05±5.10 & 31.89±5.02) respectively with no statistical significant difference. All of the study and control groups had a fetal cephalic presentation, fetal longitudinal lie with complete flexion attitude in their grips. Whereas one- half of both study group and control group had a left occiput anterior while another half had right occiput anterior in their lateral grips. All of the study and control groups their pulses ranged between (60-100 b/m), their blood pressure 120/80 and their temperature ranged from 36.5 -37.5. Also, all of them their respiration ranged between 16-20 c/m. It also manifested that the fetal heart rate among all of the study and control groups ranged from 120-160 b/m. The table also clarify that no statistical significance difference between the study and control groups regarding to all previously mentioned items.

Table (V): The number and percent distribution of study group according to their pelvic floor muscles strength pre, two months and at admission in 1st stages of labor after intervention (n = 40)

| Pelvic floor muscles strength | Study (n = 40) | | | | | |
|-------------------------------|------------------|------|-------------------------------------|------|---|------|
| | Pre intervention | | Two months after the implementation | | Admission into 1 st stage of labor | |
| | No. | % | No. | % | No. | % |
| No contract | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Weak contract | 25 | 62.5 | 16 | 40.0 | 8 | 20.0 |
| Strong contract | 15 | 37.5 | 21 | 52.5 | 23 | 57.5 |
| Powerful contract | 0 | 0.0 | 3 | 7.5 | 9 | 22.5 |
| Z(p) | | | 3.464*(0.001*) | | 4.914* (<0.001*) | |

Z: Wilcoxon signed ranks test

p: p value for comparing between pre and each other period

*: Statistically significant at p ≤ 0.05

Table (V) : elucidates that, approximately two thirds (62.5%) of the study group had suffered from Weak pelvic floor muscles strength before intervention. Two months after the intervention the picture improved. Where 52.5% and 7.5% respectively, of study group had either Strong or Powerful pelvic floor muscles contraction, the difference was statistically significant (p=0.001). Again, **at admission in 1st stage of labor** after intervention, the picture further improved. where more than half (57.5%) of them had Strong contraction. Moreover, about fifth (22.5% & 20.0%) of study subject had either powerful or week contraction, the difference was statistically significant (p=0.001)

Table (VI): The number and percent distribution of control group according to their pelvic floor muscles strength before, two months and at admission in 1st stages of labor after intervention (n = 40)

| Pelvic floor muscles strength | Control (n = 40) | | | | | |
|-------------------------------|------------------|------|-------------------------------------|------|---|------|
| | Pre intervention | | Two months after the implementation | | Admission into 1 st stage of labor | |
| | No. | % | No. | % | No. | % |
| No contract | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Weak contract | 30 | 75.0 | 33 | 82.5 | 32 | 80.0 |
| Strong contract | 10 | 25.0 | 6 | 15.0 | 7 | 17.5 |
| Powerful contract | 0 | 0.0 | 1 | 2.5 | 1 | 2.5 |
| Z(p) | | | 1.00(0.317) | | 0.577(0.564) | |

Z: Wilcoxon signed ranks test

p: p value for comparing between pre and each other period

*: Statistically significant at p ≤ 0.05

Table (VI): shows that before the intervention, 75.0% & 25.0 % and none of the entire control group respectively had either week, Strong or Powerful contraction during pelvic floor muscles strength test. Two months and at admission into

the first stage of labor, the picture had different profile. Where the percent of Weak contraction increased slightly to about four fifths (82.5 % and 80.0 % respectively). While, the Strong contract decrease below the fifth (15.0% and 17.5% respectively). Both indicate a decrease in pelvic floor muscle strength with no statistically significant difference over time.

Table (VII): The number and percent distribution of study and control group according to their pelvic floor muscles strength before, two months and at admission in 1st stages of labor after intervention (n = 80)

| Pelvic floor muscles strength | Pre-intervention | | | | Two months after the implementation | | | | Admission into 1 st stage of labor | | | |
|-------------------------------|------------------|------|------------------|------|-------------------------------------|------|------------------|------|---|------|------------------|------|
| | Study (n = 40) | | Control (n = 40) | | Study (n = 40) | | Control (n = 40) | | Study (n = 40) | | Control (n = 40) | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| No contract | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Weak contract | 25 | 62.5 | 30 | 75.0 | 16 | 40.0 | 33 | 82.5 | 8 | 20.0 | 32 | 80.0 |
| Strong contract | 15 | 37.5 | 10 | 25.0 | 21 | 52.5 | 6 | 15.0 | 23 | 57.5 | 7 | 17.5 |
| Powerful contract | 0 | 0.0 | 0 | 0.0 | 3 | 7.5 | 1 | 2.5 | 9 | 22.5 | 1 | 2.5 |
| χ^2 (p) | 1.455(0.228) | | | | 15.321* (^{MC} p<0.001*) | | | | 30.176* (^{MC} p<0.001*) | | | |

χ^2 : Chi square test MC: Monte Carlo

*: Statistically significant at p ≤ 0.05

Table (VII): illustrate the comparison between the studied subjects according to their pelvic floor muscles strength before, two months and **at admission in 1st stages of labor** of intervention (n = 80). It was noticed that slightly less than two-thirds (62.5%) of the study group compared to three –quarters (75%) of the control group had a week pelvic floor contraction before the intervention with no statistically significant difference between them (p=0.228).

After two months from the intervention (52.5%) of the study group compared to only (15%) of the control group had a strong pelvic floor muscle contraction. The differences was statistically significant between both groups (p=0.001).While, in admission in the first stage of labor (22.5%,) of the study group compared to (2.5%) of the control group had a powerful pelvic floor muscle contraction. The differences between groups was statistically significant (p=0.001*).

Table (VIII): The number and percent distribution of the study group according to their pain intensity, at admission, in 1st, 2nd and 3rd stages of labor after intervention (n = 40)

| Pain intensity | Study (n = 40) | | | | | | | |
|----------------|----------------|------|--------------------------------|------|--------------------------------|------|--------------------------------|------|
| | At admission | | 1 st stage of labor | | 2 nd stage of labor | | 3 rd stage of labor | |
| | No. | % | No. | % | No. | % | No. | % |
| Mild | 2 | 5.0 | 2 | 5.0 | 2 | 5.0 | 32 | 80.0 |
| Moderate pain | 26 | 65.0 | 30 | 75.0 | 33 | 82.5 | 8 | 20.0 |
| Severe pain | 8 | 20.0 | 5 | 12.5 | 3 | 7.5 | 0 | 0.0 |
| Worse pain | 4 | 10.0 | 3 | 7.5 | 2 | 5.0 | 0 | 0.0 |
| Z(p) | | | 1.890(0.059) | | 2.460*(0.014*) | | 5.595*($<0.001^*$) | |

Z: Wilcoxon signed ranks test

p: p value for comparing between pre and each other period

*: Statistically significant at p ≤ 0.05

Table (VIII) demonstrate the number and percent distribution of the study group according to their pain intensity. At admission and in 1st 2nd and 3rd stages of labor. It was observed that 65.0%, 20% and 10 % respectively of them had moderate, severe or worse pain. This percentage slightly increase among three- quarter or more (75.0% & 82.5%) respectively of the study group had moderate pain intensity at 1st and 2nd stages of labor the difference was statistically significant(p=0.059&p= 0.014) respectively. While, it decreased among (20.0% & 00.0%) respectively of the study group had Severe or worsted pain at 3rd stages of labor the difference was statistically significant (p=0.001).

Table (IX): The number and percent distribution of the control group according to their pain intensity, at admission, in 1st, 2nd and 3rd stages of labor after intervention (n = 40).

| Pain intensity | Control (n = 40) | | | | | | | |
|----------------|------------------|------|--------------------------------|------|--------------------------------|------|--------------------------------|------|
| | At admission | | 1 st stage of labor | | 2 nd stage of labor | | 3 rd stage of labor | |
| | No. | % | No. | % | No. | % | No. | % |
| Mild | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 10.0 |
| Moderate pain | 8 | 20.0 | 8 | 20.0 | 4 | 10.0 | 31 | 77.5 |
| Severe pain | 19 | 47.5 | 11 | 27.5 | 2 | 5.0 | 3 | 7.5 |
| Worse pain | 13 | 32.5 | 21 | 52.5 | 34 | 85.0 | 2 | 5.0 |
| Z(p) | | | 2.828* (0.005*) | | 4.456* (<0.001*) | | 4.964* (<0.001*) | |

Z: Wilcoxon signed ranks test

p: p value for comparing between pre and each other period

*: Statistically significant at p ≤ 0.05

Table (IX) demonstrate the number and percent distribution of the control group according to their **pain intensity**. At admission and in 1st, 2nd and 3rd stages of labor. It was noticed that 20.0%, 47.5% and 32.5 % respectively of them had moderate, severe or worse pain at admission. This percentage increased among control group who has worse pain intensity at 1st and 2nd stages of labor(52.0% & 85.0%) respectively the difference as statistically significant (p=0.005 & p= 0.001) respectively. While, it decreased among control group who had severe pain at 1st and 2nd stages of labor(27% & 5%) the difference as statistically significant (p=0.001) respectively.

Table (X): Number and Percent distribution of the study & control groups according to their pain intensity, at admission, in 1st, 2nd and 3rd stages of labor after intervention (n = 80).

| Pain intensity | At admission | | | | 1 st stage of labor | | | | 2 nd stage of labor | | | | 3 rd stage of labor | | | |
|--------------------------|-------------------|------|------------------|------|--------------------------------|------|------------------|------|--------------------------------|------|------------------|------|--------------------------------|------|------------------|------|
| | Study (n = 40) | | Control (n = 40) | | Study (n = 40) | | Control (n = 40) | | Study (n = 40) | | Control (n = 40) | | Study (n = 40) | | Control (n = 40) | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Mild | 2 | 5.0 | 0 | 0.0 | 2 | 5.0 | 0 | 0.0 | 2 | 5.0 | 0 | 0.0 | 32 | 80.0 | 4 | 10.0 |
| Moderate pain | 26 | 65.0 | 8 | 20.0 | 30 | 75.0 | 8 | 20.0 | 33 | 82.5 | 4 | 10.0 | 8 | 20.0 | 31 | 77.5 |
| Severe pain | 8 | 20.0 | 19 | 47.5 | 5 | 12.5 | 11 | 27.5 | 3 | 7.5 | 2 | 5.0 | 0 | 0.0 | 3 | 7.5 |
| Worse pain | 4 | 10.0 | 13 | 32.5 | 3 | 7.5 | 21 | 52.5 | 2 | 5.0 | 34 | 85.0 | 0 | 0.0 | 2 | 5.0 |
| χ² (p) | 20.538* (<0.001*) | | | | 31.409* (<0.001*) | | | | 59.901* (<0.001*) | | | | 42.215* (<0.001*) | | | |

Table (X): demonstrate the number and percent distribution of the study and control groups according to their pain intensity at admission and in 1st, 2nd and 3rd stages of labor. It was clear that there was statistically significant differences between the study and control group (p<0.001) through the different period. It was manifested that (10 %, 7.5%,5.0% and 0.0%) of the study group compared to (32.5%, 52.5%, 85.0% and 5.0%) respectively of the control group had a worst level of pain at the time of admission and in 1st, 2nd and 3rd stages of labor. The there was a statistically significant difference(P=0.001). Again, at 1st stage of labor, a statistically significant difference (P=0.001) had reappeared between the two groups in the favor of the study group. Where 75% & 12.5% of the study group had moderate to severe pain compared to 20% & 27% of the control group respectively. Such difference had persisted 2nd and 3rd stages of labor in the favor of the study group. The difference was statistically significant (P=0.001&P=0.001) respectively.

Table (XI): Relation between the two studied groups according to maternal course of labor and its outcome (n = 80)

| Q | A. Maternal course of labor and its outcome assessment checklist | Study (n = 40) | | Control (n = 40) | | χ^2 | p |
|--|--|----------------|-------|------------------|-------|----------|-------------|
| | | No. | % | No. | % | | |
| 1 Modes of delivery | Normal labor (yes) | 39 | 97.5 | 32 | 80.0 | 6.135* | FE p=0.029* |
| | CS (no) | 1 | 2.5 | 8 | 20.0 | | |
| 2 Progression of labor | Normal progression | 40 | 100.0 | 34 | 87.2 | 5.475* | FE p=0.026* |
| | Induction (No) | 0 | 0.0 | 5 | 12.8 | | |
| 4 Duration of first stage of labor | Min. – Max. | 2.0 – 10.0 | | 3.00 – 11.0 | | t=1.462 | 0.148 |
| | Mean ± SD. | 4.88 ± 1.98 | | 5.53 ± 2.0 | | | |
| | | | | | | | |
| 6 Duration of second stage of labor | Min. – Max. | 0.17 – 2.0 | | 0.17 – 20.0 | | t=2.059* | 0.046* |
| | Mean ± SD. | 0.88 ± 0.60 | | 2.84 ± 6.0 | | | |
| | | | | | | | |
| 7 Total duration of stages of labor | Min. – Max. | 2.15 – 12.0 | | 3.30 – 12.0 | | t=2.035* | 0.045* |
| | Mean ± SD. | 5.76 ± 2.63 | | 7.11 ± 3.25 | | | |
| | | | | | | | |
| 8 Occurrence and Degree of perineal laceration: | No | 39 | 97.5 | 23 | 76.7 | 6.856* | 0.018* |
| | 1 st perinea laceration | 1 | 2.5 | 5 | 16.7 | | |
| | 2 nd perinea laceration | 0 | 0.0 | 2 | 6.7 | | |
| | 3 rd perinea laceration | 0 | 0.0 | 0 | 0.0 | | |
| | 4 th perinea laceration | 0 | 0.0 | 0 | 0.0 | | |
| | | | | | | | |
| 9 use of anesthesia | Not Applicable | 0 | 0.0 | 40 | 100.0 | 80.00* | <0.001* |
| | Yes | 40 | 100.0 | 0 | 0.0 | | |
| 10 Complications during childbirth | Yes | 2 | 5.0 | 8 | 20.0 | 80.00* | <0.001* |
| | No | 38 | 95.0 | 32 | 80.0 | | |
| 11 Complications during childbirth # | 1-Difficult labor | 1 | 50.0 | 8 | 100.0 | 6.135* | FE p=0.029* |
| | 2-Umbilical cord prolapse | 0 | 0.0 | 0 | 0.0 | | |
| | 3-Repeated vaginal injury | 1 | 50.0 | 5 | 62.5 | | |
| | 4-Bleeding | 0 | 0.0 | 0 | 0.0 | | |
| | 5-Inertia of uterus | 0 | 0.0 | 0 | 0.0 | | |
| | 6-Retained parts of placenta | 0 | 0.0 | 0 | 0.0 | | |
| | | | | | | | |

χ^2 : Chi square test FE: Fisher Exact*: Statistically significant at $p \leq 0.05$ #: More than one answer

Table (XI): illustrate the relation between the studied groups according to maternal course of labor and its outcome. It was noticed that there was statistically significance difference between the study and control group regarding the type of delivery ($p=0.026$). Regarding progression of labor, none (0%) of the study group compared to (12.8%) of the control group had received induction during their labor. Concerning to the duration of second, there was significance differences between the study& control groups in favor of study group ($p=0.046$)., While, there was no significance differences between two groups regarding the duration of first stage. As regarding the mean score of the total duration of **stages of labor** the study group was lower (5.76 ± 2.63) than the control group (7.11 ± 3.25) with a significance differences between the both groups ($p=0.045$). This table also shows that the vast majority (97.5% & 50%) of the study group compared to

(76.7% & 100%) of the control group had no perennial laceration during delivery, difficult labor, the difference denotes a statistically significant difference between two groups (p=0.018, p=0.029) respectively.

Table (XII): Relation between the two studied groups according to fetal course of labor and its outcome

| Q | B. Fetal course of labor:- | Study (n = 40) | | Control (n = 40) | | χ^2 | FE p |
|-----------|---|-------------------|-------|---------------------|------|----------|--------|
| | | No. | % | No. | % | | |
| 12 | Apgar Scoring | | | | | | |
| | After 1 minute | | | | | | |
| | Absent | 0 | 0.0 | 0 | 0.0 | | |
| | (7 - 10) | 40 | 100.0 | 36 | 90.0 | 4.211* | 0.040* |
| | (4 - 6) | 0 | 0.0 | 4 | 10.0 | | |
| | (0 - 3) | 0 | 0.0 | 0 | 0.0 | | |
| | After 5 minute | | | | | | |
| | Absent | 0 | 0.0 | 0 | 0.0 | | |
| | (7 - 10) | 40 | 100.0 | 39 | 97.5 | 1.013 | 1.000 |
| | (4 - 6) | 0 | 0.0 | 1 | 2.5 | | |
| | (0 - 3) | 0 | 0.0 | 0 | 0.0 | | |
| 13 | Fetal problems (Complications during childbirth) | | | | | | |
| | a. FHR more than 160b/m(tachycardia) | 0 | 0.0 | 0 | 0.0 | - | - |
| | b. FHR less than 100 b/m (bradycardia) | 0 | 0.0 | 4 | 10.0 | 4.211 | 0.116 |
| | c. Excessive moulding | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | d- Excessive Caput succidenium | 0 | 0.0 | 0 | 0.0 | - | - |
| | e. Need O2, resuscitation | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | f. Fetal birth injury | 0 | 0.0 | 0 | 0.0 | - | - |
| 14 | Signs of distress during labor | | | | | | |
| | Color change | 0 | 0.0 | 4 | 10.0 | 4.211 | 0.116 |
| | Changes of breathing | 0 | 0.0 | 4 | 10.0 | 4.211 | 0.116 |
| | Changes of oxygenation | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | Hiccups | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | Sneezing | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | Yawning | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | Squirming (tense) | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | Crying | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | Eye squeezing | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | Tremor of extremities | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | Splayed fingers/toes | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | Extended arm | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | Extended leg | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | Hand open with finger open | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |
| | Tight fist | 0 | 0.0 | 1 | 2.5 | 1.013 | 1.000 |

χ^2 : Chi square test

*: Statistically significant at p ≤ 0.05

#: More than one answer

Table (XII): illustrate the mean differences between the study, control groups according to fetal course of labor. It was noticed that there was significance differences between the study and control groups (p=0.040) regarding **Apgar scoring At 1st minute** where(100.% & 00.0%) of the study compared to (90.% & 10%) of control group had (7-10) & (4 - 6) Apgar scoring respectively. Regarding Apgar scoring **AT 5th minute**, picture had slightly improved among both groups, all (100 %) of study group had (7-10) scores while (97 % of the control group had also(7-10) scores with no statistically significant

difference. As regard to fetal complications none (0%) of the study group compared to (10%, 2.5% & 2.5%) respectively of the control groups their fetuses had bradycardia excessive molding and they need resuscitation with no statistically significant difference.

4. DISCUSSION

Pregnancy is a physiological process that can occur without medical intervention where all organs of the body are adjusted to maintain both maternal and newborn health. Normal delivery is the best finale of the pregnancy for the mother and the newborn both from the physical, psychological, and sociological point of view^(3, 4). It needs more physical and emotional preparation for pregnant woman as the main target of the pregnancy for the future mothers, their families, and the health care system that supports them before and during labor.[11]

Pregnancy more than childbirth appears to contribute to altered long term pelvic floor function in later life due to the hormones of pregnancy. This hormone has been associated with relaxation and structural effects on the connective tissue of the pelvic floor during the third trimester and childbirth. These effects reduce the strength of the pelvic floor to help ease the birthing process. Evidence also shows that some obstetric factors may cause partial damage to the pelvic floor nerves in some women particular the pudendal nerve that can cause weakness of the pelvic floor muscles and relaxation of the external urethral sphincter, resulting in urinary incontinence. Strengthening the pelvic floor muscles (PFM) can play a fundamental role in maintaining continence and integrity of the pelvic floor. Therefore prenatal general exercise has been recommended as the primary requirement of physiological pregnancy and birth by health-promoting organizations [12].

Hence, this study aimed to determine the effect of implementing the exercise program during the third trimester of pregnancy on course of labor and birth outcome. The discussion of the study results will be presented under main three main headings : pelvic floor muscle strengthens test, visual analogue scale, maternal course and its outcome assessment.

In relation to the study subjects' socio-demographic characteristics, the finding of the present study revealed that there is no significant difference between the study and control groups before the implementation of the exercise program. It is surprising ; this consistent profile of the participants was useful in limiting extraneous factors, which could interfere with the effect of the intended intervention (exercising program on course of labor and its outcome). It also helped in understanding and securing the reliability and relevance of the forthcoming results of the current study.

Pelvic Floor Muscle Strengthens Test

The results of the current study was noticed that there was no statistically significant difference between the study and control groups at pre intervention (Table VII) ($p=0.228$). This could be attributed to the fact that the study subjects don't receive any instruction or training about the pelvic floor muscles exercise in their previous pregnancies.

In relation to the study subjects pelvic strength test at two months after intervention and in admission to first stage of labor, the finding of the present study showed that there was highly statistically significant difference between the study and control groups ($p<0.001^*$) in favor of the study group (Table VII). This could be attributed to the fact to many reasons about experimental group. **First**, communicating the high expectations to study group pre-program implementation had motivated them to exert effort for adherence to researcher instructions regarding to the exercise program **second**, the valuable information given about types, indication, benefits and advantages, precautions, steps and technique of application through the training sessions as well as the use of different learning activates such as power point presentation, diagrams, and photos about PFM. all of these techniques encourage the pregnant women to perform the PFM exercise on a regular base. **Third**, the researcher was interpret and answer the pregnant women questions.

This results of the present study are consistent with the findings of Soave, et al. [13] **They had** conducted a study entitled "**Pelvic floor muscle training for prevention and treatment of urinary incontinence during pregnancy and after childbirth and its effect on urinary system and supportive structures assessed by objective measurement techniques**". who found that PFMT training elevates the pelvic floor and the pelvic organs, closes the levator hiatus, reduces pubovisceral length and elevates the resting position of the bladder and finally increased the strength of pelvic floor muscles. This agreement between the finding of this study and the current study -in this respect- may be attributed to the fact that the aforementioned study sample size was almost equal to that of the current study's sample (80 pregnant women) and the program was conducted on the third trimester of pregnancy. Also, both results indicated that the adherence

to pelvic floor muscles on a regular base during the third trimester of pregnancy will improve the strength of pelvic floor muscles and finally had apposite impact on pregnancy outcome.

Visual analogue scale

In the present study we observed the influence of exercise program on labor pain by using Visual Analogue Scale. **Pain** is defined as a localized or generalized unpleasant bodily sensation or complex of sensations that causes mild to severe physical discomfort and emotional distress and typically results from bodily disorder. We used the **Visual Analogue Scale (VAS)** to measure the intensity of the participants' pain. The VAS is a reliable and valid scale that widely used all over the world for the assessment of pain intensity.

The results of the current study revealed that there was a statistically significant difference between the study and control groups ($p= 0.001^*$) at admission and in 1st, 2nd and 3rd stages of labor (Table X). The pain in both group was increased during the process of labor, but more less in study group than control group in which the pain reach approximately maximum level of pain score. The assessment of pain score by visual analogue scale during first, second and third phase revealed that the mothers in study group have significantly difference than those in control group with ($p= 0.001^*$) at admission, ($p= 0.001^*$), at first stage ($p=0.001^*$) at third stage ($p=0.001^*$) In present study determined that the exercise program with individualized health counseling used relieve and resolve the severity of pain, confirming our research hypothesis. **This result is probably attributed to the fact that** the repetitive contraction in the stretching and pelvic floor muscles exercise that help in improvement of venous blood to return, resulting in the increase of prostaglandins and other substances which help prevent and reduce back pain and discomfort in the pelvis and the abdomen.

This results of the present study are consistent with the findings of Agur, et al. [14] They had conducted a study entitled "**Does antenatal pelvic floor muscle training affect the outcome of labor? A randomized controlled trial.**" The study result revealed that the present study revealed that perineal pain intensity had decreased during labor among the study group. Meanwhile, such a decrease was not observed among the control group after received routine care.

The results of the current study is not in agreement with two researchers *first*, Dias, et al. [15] they conducted a study titled "**Effect of pelvic floor muscle training on labor and newborn outcomes: a randomized controlled trial.**" The results of the present study demonstrated that pelvic floor muscle training had no effects on intensity of labor pain during labor. *second* by Stuge [16] they had conducted a study entitled "**Evidence of stabilizing exercises for low back- and pelvic girdle pain – a critical review.**" they had reported that no evidence of exercise in the management of pain.

Maternal course of labor and its outcome

Mode of delivery

The results of the current study revealed that there was a significance difference between the study and control groups regarding their mode of delivery ($p =0.029$). in which all of the study group were delivered normally. This result could be attributed to the fact that pelvic floor muscles exercises improve perineal circulation and increase pelvic floor strength and it will lead to increase perineal elasticity and facilitate normal vaginal delivery. The results of the current study are consistent with three researches *first* the previously mentioned study by, **El-Shamy and Abd El Fatah [17]**. They had reported that A significant correlation was observed between PFM strength at 36 weeks of gestation and mode of delivery (vaginal delivery: $r = 0.58$, $p < 0.05$; caesarean delivery: $r = -0.49$, $p < 0.05$). *Second* [18], they had conducted a study entitled "**A lifestyle intervention of weight-gain restriction: diet and exercise in obese women with gestational diabetes mellitus**" their study revealed that a reduced caesarean section proportion as a result of regular exercise during pregnancy. In which the proper antenatal exercises strengthen the **PFMs** by 90%, which this is essential for normal delivery.

On the other hand, the results of the current study is not in harmony with many researches *first* the previously mentioned study by, Dias, et al. [15]. Their study revealed that there was no a statistically significant difference between the study and control groups regarding their mode of delivery. *Second*, Hall and Kaufmann [19] they had conducted a study entitled "**Effects of aerobic and strength conditioning on pregnancy outcomes. Their results reported** that no relationship between antenatal exercise and mode of delivery.

Progression of labor

Related to the received induction during labor there was a significance difference between two groups ($p= 0.026$). The result of present study is in harmony with the study of Karaçam, et al. [20] they had conducted a study entitled " **Effects of Prenatal Perineal Massage and Kegeal Exercises on the Integrity of Postnatal Perine**" their results revealed that the majority of the control group had received induction during labor than the study group who received antenatal exercise. The difference between two groups was found statistically significant.

The duration of the first, second stage of labor

The results of the present study showed that there was no a statistically significant difference between the study and control groups regarding the duration of the first stage of labor. ($p= 0.148$). whereas there was a statistically significant difference between the study and control groups regarding the duration of the second stage of labor as well as the total duration of both stages in favor of the study group ($p= 0.046, P= 0.046^*$ respectively). the shorter duration in the experimental group as the possible effect of exercise program that lead to effect on prostaglandins, which play a significant role in preparing the uterus and thus shortening the duration of the active stage of labor. One of the factors that shorten the second stage of labor is the voluntary contraction of abdominal muscles. The exercises included in the training protocol of this research involved abdominal and pelvic muscles.

Moreover, the findings of present study are to some extent in accordance with the study of Barakat, et al. [21]. They had conducted a study entitled " **Exercise during pregnancy is associated with a shorter duration of labor. A randomized clinical trial**" They had found that the duration of the second stage of labor was shorter in women who performed exercises during pregnancy with a statistically significant difference between both group. The findings of present study are not accordance with two researchers *First*, Rad and Jahanshiri [22] she conducted a study titled " **Effect of a period of exercise during pregnancy on certain delivery parameter**" her result concluded that were no significant differences between these groups in duration of the second stage of labor. *Second* May [23] who exploring the " **relationship between antenatal pelvic floor muscle training exercise and labor outcomes**". The study finding revealed that, there was no significant difference in the duration of second stage of labor between the two groups or in the need for instrumental delivery, as well as PFME does not appear to facilitate or obstruct labor.

The occurrence of perineal laceration

Perineal trauma refers to any damage to the genitalia during childbirth. There are two classification of perineal trauma: Spontaneous perineal trauma which is called non intentional trauma (tears) and Episiotomy which is called intentional trauma. **Episiotomy** is defined as a surgical incision in the perineum to enlarge the vaginal introitus and facilitate delivery of the fetus. Perineal tears are classically divided into four categories: **1st degree**: injury to the skin (includes fourchette, hymen, labia, vaginal epithelium); **2nd degree**: injury that may involve the posterior vaginal wall, subcutaneous fat, perineal skin layer, superficial muscles, (bulbo-cavernosus and superficial transverse perinei) and deep muscles (pubococcygeus); **3rd degree**: this involves disruption of the vaginal pithelium, perineal skin, perineal body and anal sphincter muscles; **4th degree**: this involves complete disruption of external and internal anal sphincter complex and the anal epithelium.

The present study results revealed a significant decreased in the incidence of episiotomy and tear (vaginal and perineal tears) among the study group where ($p=0.018$). This finding can suggest that pelvic floor exercise can enhance relaxation, reduce muscle spasm and reduce pain during labor. Also pelvic floor exercise may cause vasodilatation of blood vessels which can increase blood flow in the tissue around the area that is compressed so that the decreasing of ischemia tissue and pain can be reduced.

The results of the current study is in line with *The findings of the study of Ghodsi and Asltoghiri [24]* Ghodsi Z (2012) [12] they had examined the " **Exercise and pregnancy : duration of labor stages and perinea tear rate** " their results revealed that the rates of intact perineum were significantly higher in the trained group (36.8% vs. 23.8%) and women in the training group had slightly lower rates of second-degree tears (40.2% vs. 53.6%).

The agreement between the current study and the aforementioned study findings may attribute to the fact that the exercises improve the blood circulation to pelvic organs and improve the elasticity and strengthening the pelvic floor muscles during pregnancy ultimately this will lead to decrease the incidence of perineal laceration. Therefore all of them had recommended

that the pelvic floor muscles exercise is very important after pregnancy to maintain a healthy state of perineal flexibility and vitality, and also to promote perineal healing, regain bladder control, and strengthen pelvic floor muscles. However, the result of the current study is not harmony with the findings of the previously mentioned study by Dias, et al. [25] the results of this randomized controlled trial showed that there was no difference between the training group and control group regarding the rate of occurrence of perineal laceration.

Fetal course of labor

Apgar is a quick test performed on a baby at 1 and 5 minutes after birth. The 1-minute score determines how well the baby tolerated the birthing process. The 5-minute score tells the health care provider how well the baby is doing outside the mother's womb. The Apgar test is done by provider examines the baby's: breathing effort, heart rate, muscle tone, reflexes and skin color Each category is scored with 0, 1, or 2, depending on the observed condition.

Another appealing finding in this study is the **Apgar score** of the newborns the result showed that there was a statistically significance difference between the study group and the control group after one minute ($p=.040$) but after 5-minute was ($p= 1.000$) in favor of the study group. The finding goes in harmony with, **Haakstad, et al. [26]** they had conducted a study entitled "**Self-reporting compared to motion monitor in the measurement of physical activity during pregnancy**" their study showing a higher rate of positive birth outcome in the exercise group than in the control group.

However, the result of the current study is not consistent with the results of MØrkved, et al. [27] they had conducted a study entitled "**Does group training during pregnancy prevent lumbo-pelvic pain?**" Their results showed that there was no difference between the training group and control group regarding labor or newborn outcomes. they also reported that the 1st minute values were similar for the control group and the training group.

A. Page Layout and Font Face

III. CONCLUSION

Based on the results of the current study, it can be concluded that, pregnant women who practice exercise program during the third trimester of pregnancy exhibit normal course of labor and lower birth outcome risk than those who do not practice it with a statistically significant difference over a period of three months after the implementation of the exercise program. Therefore, the research hypotheses are accepted.

RECOMMENDATIONS

- In service training program should be carried out for nurses who are working in antenatal clinics to upgrade their knowledge regarding the important of exercises during pregnancy.
- Enforce good postpartum care with more emphasis in important of pelvic floor muscles exercise.

For further researches

- Replication of the same study in different Egyptian governorates especially rural and Upper Egypt to compare and validate the present study findings.
- Investigate barrier against practicing the pelvic floor muscles exercise during pregnancy.

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