APPLICATIONS OF KINETIC MEANS IN PREGNANCY AND THEIR INFLUENCES ON MATERNAL AND CHILD

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Abstract:*Assumptions*. Given the fact that, in recent years, in our country, there is an increase in the average age at which women decide to procreate, this entails greater risks both for mother and child and the monitoring requirement of the pregnant is justified further enhanced ,the present paper meet the needs of a society with a low birth rate. According to this context , we consider that a specific kinetic program for each pregnancy trimester applied to the pregnant woman , may act in pursuance of a better adaptation to said biological condition .

Aims. Application of an appropriate kinetic program regarding age ,workout degree , gestational age and pregnancy outcome , into pregnancy , may contribute to minimizing the negative consequences caused by this , namely a delivery in optimal conditions .

Methods. The present study based on the experiment method was conducted between January 2013 - June 2014 on a sample of 28 subjects , aged 24- 36, pregnant women in the last two trimesters of pregnancy .

Results From the obtained results analysis it can be noted the improvement of pregnancy possible complications , a normal fetal expulsion duration and a APGAR score with maximum values in most of the mothers's newborns.

Conclusions. At the experimental group subjects, the clinic parameter values tracked during 6 months of individualized and systematic applying of kinetic program , showed beneficial impacts of kinetotherapy regarding mother and child , in pregnancy.

Key words: pregnancy, kinetotherapy, birth, Apgar Score

Introduction

Pregnancy is a "physiological phenomenon" [1] that represents the "state in which the woman is between the moment of ovum fertilization and birth "[2].

During pregnancy a series of changes to all body organs and systems are produced ; changes that are triggered by the massive increase in the amount of hormones [3] with influences on the fetus and the expectant mother .

Pregnant woman's body adapting to the demands imposed by pregnancy , underlies the emergence of several clinical signs that in other circumstances can be considered pathological , as : joint hyperlaxity , hemodilution with anemia false appearance , digestive disorders , circulatory, respiratory , etc. . Every pregnancy trimester specific kinetic means may prevent and relieve pregnancy- related changes[4], and birth may be facilitated [5].

In order to support the above statement studies attest by shown that the exercise is an important condition for human health [6] and pregnant woman body's response to exercise is similar to non-pregnant woman's one [7].

The scientific literature mention the role of exercise in pregnancy with effects on mothers that lies in body weight control, improved blood circulation [8], maintaining mobility and overall muscle tone, relieve back pain [9,10], prevention of postpartum urinary incontinence, by pelvic floor toning exercises [11,12,13], reduced physical and mental stress caused by pregnancy [14] but also decrease the risk of gestational diabetes, hypertension [15], preeclampsia [16] and preterm delivery [17].

According to Clapp, J. , F. [18] and other specialists in the field [19,20], the benefits of exercise can also be observed to fetus, under the form on the type of effects as : reduced fat, reduced risk of "small for dates" fetus , better neuromotor behaviour development, and a better stress tolerance of the fetus.

Given the fact that, in recent years in our country, there is an increase in average age at which women decide to procreate [21] and this entails greater risks both for mother and child and the monitoring requirement of the pregnant is justified further enhanced ,the present paper meet the needs of a society with a low birth rate .

According to this context, we consider that a specific kinetic program for each pregnancy trimester applied to the pregnant woman , may act in pursuance of a better adaptation to said biological condition .

Hypotheses

Application of an appropriate kinetic program regarding age ,workout degree , gestational age and pregnancy outcome , into pregnancy , may contribute to minimizing the negative consequences caused by this , namely a delivery in optimal conditions .

Material and methods

Research protocol

a) Period of the research

The present study required a series of research methods (theoretical and practical documentation, investigation, measurements and specific assessments, results analysis) being based on

experimental Method. This last was carried out between January 2013 and June 2014 .

b) Subjects

The study was performed at the Centre for future parents training - "Active Center" from Bucharest, on a sample of 28 subjects, aged between 24-36 years old , pregnant women in the last two pregnancy trimesters .

To estabilish the role of kinetotherapy in preganancy , groups ,experimental and control of subjects were selected, tracked parameters were estabilished , elaborate kinetic programs were applied and the subjects were monitored analysis and results interpretation .

There were selected two groups (batches) of 14 pregnant women: the control group random estabilished from women who didn't benefit of kinetotherapy during previous pregnancy or the present one and the experimental group , which consists by women who didn't benefit of kinetotherapy during previous pregnancy , but in the present one, they followed a kinetic program. Note that all subjects were in the second or third birth, and their participation in the study was consensual and conscious.

c) Applied Tests

The study subjects were evaluated at two testing times : initially (T_I) before applying first kinetic program from the second pregnancy trimester and final (T_F), at 6 months after it. The collected data were initially introduced in pregnant pacients 's individual records , subsequent in tables and graphs .

In order to monitor and results quantification, were evaluated the following parameters :

- Somatic parameter such as body weight assessed using scale;
- Functional parameters as: blood pressure, heart rate using the electronic tensiometer;
- Joint Amplitude of flexion and abduction on coxal-femoral joint parameter, measured using the goniometer;
- The complications were pointed by using positive sign (+) and their absence has been denoted with negative sign (-) ;
- The fetus expulsion duration representing the second stage of total labor duration value to the total length of 50 minutes at women on first birth and 20 minutes at those who bore before [22].
- Apgar Score that appreciates how the newborn is adapting to extra-uterine life through the evaluation of five signs: breathing, heart rate, skin color, irritability reflex and muscule tone [23]. Each element of Apgar Score will be marked with 0,1 or 2 points, normal value for newborn on term being between 8 and 10 and a score below 7 requiring resuscitation of the newborn.

d) Studied moments

Applied physioherapy over 6 months (between T_I and T_F times), targeted the achievement of both general and specific objectives for each pregnancy trimester.

The general objectives common to all three trimesters of pregnancy (even if the experiment was not carried out during first trimester , miscarriage risk being high) were :

- Maintaining postural tone adjusted to center of gravity 's changes that accompany the pregnancy,
- Articular-muscle increasing range of motion maintain
- Weight control
- Circulatory disorder combat
- Breath education
- Muscle and neuropsychological relaxation

To this goals are added others specific to second and third trimester of pregnancy :

- Toning abdominal and gluteal muscles ,
- Selfcontrol and perineum muscles 's tone.
- Flattening trend of plantar vault and lumbar hyperlordosis repeal
- Respiratory education into labor preparation.

The means used to achieve the set objectives were exercise used in moderate intensity with a frequency of at least three times a week and with at least 20 minutes duration [7, 24], the needed posture to avoid spine overstrain in daily activities and for venous and lymphatic drainage stimulation [25], massage with relaxing effect, but also prophylactic and therapeutic on skin, muscles, breasts and circulatory, respiratory and digestive systems [26] and not the last diversified and complete diet for child formation that has to be based on natural foods such as fruits, vegetables and herbs [27].

In applying individualized kinetic programs have been taken into account the specific methodological guidance of the last two trimesters of pregnancy :

- Avoiding the exercise from suspine position and small base of support ones but also avoiding those requiring prolonged standing without associating other movements,
- Avoiding exercises of speed, strength, stamina, with increased abdominal strain, jumping, contact sports,
- Monitoring cardiorespiratory parameters during the exercise (heart rate's value should not increase over 140 beats/minute)
- Pregnant instruction regard reporting any complaints that may arise during kinetic program , as: vertigo, different allergies , uterine contractions,

bleeding, dyspnoea, heartburn type of burnings, changes in cardiorespiratory parameters etc.
In both pregnancy trimesters were used walking exercises, stretching exercises, breathing exercises, muscle toning exercises for upper and lower levels and perineum muscle control , relaxation exercises.
Those exercises were adapted to pregnants and carried after Pilates's method principles „ the art of self-control" [28], a light form of training, efficient, conductive to mobility, strength and balance exercises for muscle toning coordinated with breathing and stretching exercises [29, 30].
Specific kinetic programs for second and third trimester are complex, but the scarcity of space makes imposibile presenting them in full extension.

e) Statistical used methods

The computer program used for statistical processing was Microsoft Excel 2013.

Statistical indicators that were followed, were arithmetic averages and the difference between initial and final assess parameter values.

Results

Following evaluations has been noted :

- Data from anamnesis interview showed a mean age of subjects 29 years and in terms of distribution by age, held a majority in the age group 24-30 years with 17 subjects, followed by age group from 31-36 years.
- Monitoring body weight before pregnancy at 3 and 9 pregnancy months, revealed a good evolution of this parameter in experimental group , whose average was 70,5 comparing to control group whose average value was 70,8 (the values were the final ones) ; we mention that the body weight average before pregnancy in the experimental group was higher (60,2) than the control group (57,5) according to the schedule no.1.

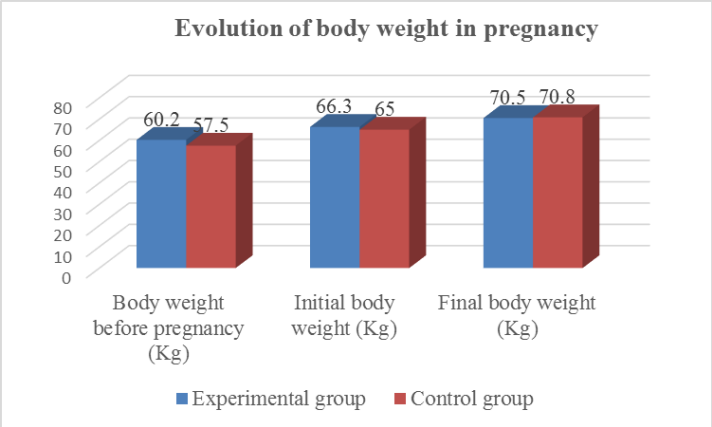

Chart 1: Evolution of body weight in pregnancy

- Arithmetic heart rate and blood pressure in both groups remained constant at first and final testing. No significant changes were noted in terms of evolution blood pressure. This was within normal values in both groups. Although there was a small number oscillating values in the control group (3) and the experimental group (2). These revealed no health problems or fetal distress.
- The coxofemoral joint 's mobility increased . Subjects of experimental group were increases flexion between 5 ° -15 °, and the movement of abduction between 5 ° -10 °, and the obtained values of the control group subjects remained constant.
- Complications in pregnancy can be seen in Table no.1. A maximum frequency of venous stasis was noted at the control group subjects, meanwhile in the experimental group were 4 subjects with lower limbs edema. The flattening of the plantar vault has been noted in 8 subjects of the control group and at 3 from the experimental one , provided that no subject presented this at the initial testing . Lumbar discopathies were present at the initial evaluation in 4 subjects from the control group and at the final evaluation 10 subjects accused back pain .In the experimental group only 3 subjects had lumbar discopathy, at the initial assessment their number being higher (7 subjects).

Crt. No.	Control group						Experimental group					
	The flattening of the plantar vault		The leg venous stasis		Lumbar discopathy		The flattening of the plantar vault		The leg venous stasis		Lumbar discopathy	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	-	-	-	+	-	+	-	-	-	+	-	-
2	-	+	+	+	-	-	-	-	+	+	-	-
3	-	+	+	+	-	+	-	+	-	-	+	-
4	-	+	+	+	+	+	-	-	-	-	-	+
5	-	-	-	+	+	+	-	+	+	-	+	-
6	-	+	+	+	+	+	-	-	-	-	-	+
7	-	-	-	+	-	+	-	-	+	+	-	-
8	-	+	-	+	-	-	-	-	+	-	+	-
9	-	+	+	+	-	+	-	-	+	-	+	-
10	-	-	+	+	-	+	-	-	+	-	-	-
11	-	-	-	+	-	+	-	-	-	-	+	-
12	-	+	+	+	+	+	-	-	-	-	+	-
13	-	-	-	+	-	-	-	+	-	-	-	-
14	-	+	-	+	-	-	-	-	+	+	+	+
Total	14 –	6 – 8 +	7 – 7 +	14 +	10 – 4 +	4 – 10 +	14 –	11 – 3 +	7 – 7 +	10 – 4 +	7 – 7 +	11 – 3 +

Table no. 1. Complications centralization of both groups subjects

- Expulsion duration's average of pregnant women from the experimental group was 49 minutes while in the control group's subjects was 56 minutes. The difference between them is negligible .

- Apgar Score showed excellent values. Of the 28 infants, 21 achieved scores of 10, 9 of which 12 belonged to the control group and the experimental and only 7 have obtained grades of 9, 5 of which were given to the control group.

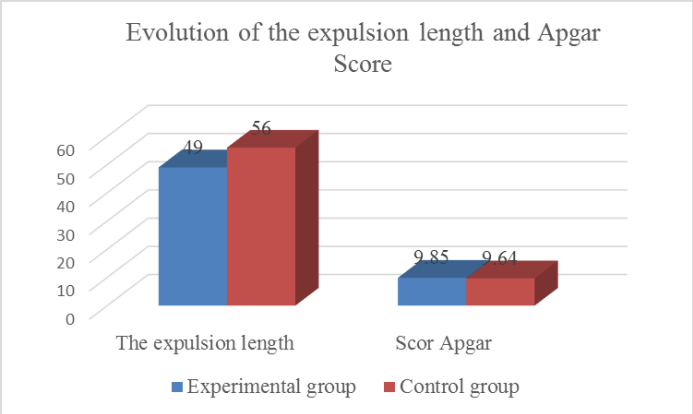

Chart 2: Evolution of the expulsion length and Apgar Score

Discussions

From the analysis results in experimental subjects , we observe a good physical condition associated with a normal body weight , an effective control of it which leads us to appreciate the contribution of kinetotherapy in preventing deposit extra pounds during pregnancy.

Increasing the parameter of joint amplitude in flexion and hip abduction at the experimental group subjects reveals informations about kinetic means benefit applied in pregnancy, given that all the subjects are more mobile as a result of increasing the amount of hormones (estrogen and progesterone) and the release of a third called relaxin with r ligaments and muscle relax effect. Hormonal changes lead to good mobility but also to joint instability, another reason for practicing kinetotherapy in order to toning muscles .

Relieve of the lower back pain and lower limb edema at a smaller number of subjects in experimental group, lead us to say that kinetic means can minimize the occurrence of pregnancy complications .

The obtain results match to scientific literature data , according that a properly dosed exercise and applied in accordance with obstetric indications decreases the incidence of back pain and edema sometimes entirely without drugs intake of therapeutic interventions [9, 25,31].

This study shows an incidence of lumbar intervertebral 50% in the experimental group and 28.5% in the control group. Also, of the 7 subjects with low back pain in the experimental group, 3 subjects at final evaluation accuse only those pains. A similar study conducted by Ayanniyi, O., Sanya, A., O., Ogunlade, S., O. and Oni-Orisan,

M., O. reveal the presence of lumbar intervertebral a rate of 52.5% compared with 47.5% the percentage of subjects without low back pain [32].

An improvement in back pain through kinetotherapy is observed in sudy subjects conducted by Kihlstrand, M., Stenman, B., Nilsson, S., and Axelsson, O., citați de Pivarnik, J., Chambliss, H., Clapp, J., Dugan, S., Hatch, M., Lovelady, C., Mottola, M. and Williams, M.. Kihlstrand, M., B. et al. . It notes that the practice during second trimester of exercise in water significantly reduces back pain intensity[33].

The values obtained for the expulsion of the fetus duration are insignificant unlike the total labor duration values reported in a 2006 study in whichthe difference between the two groups (labor duration 4 hours and 15 minutes at pregnant women exercise practitioners compared to 7 hours and 30 minutes in the non-practicing pregnants) shows how kinetotherapy reduce mother‘s labor duration thus is reducing substantially fetal distress [5].

Apgar Score ‘s value was maximum at 12 newborns of the mothers in experimental group and at 9 newborns of mothers in the control group.

Conclusions

1. The average age at which women decice to have a second or a third child is 29 years old.
2. Influence of the kinetic program is reflected in the decrease pregnancy complications such as lower back pain relief , reducing the incidence of circulatory disorders and plantar dome flattening .
3. Systematic , regular and individualized exercising help reduce fat deposits and contribute at an effective body weight control.
4. Evolution of parameters as : heart rate , arterial blood pressure, fetal expulsion duration does not present significant differences between the two groups, whichlet us see the possibility of aminimum interference of kinetotherapy in pregnancy and on this values.
5. Most of mother’s newborns that followed kinetotherapy in the last two pregnancy trimesters have the maximum Apgar Score value and do not present fetal disstres.
6. The practical application of kinetic program in the second and third trimesters of pregnancy helps to maintain or gain a state of physical and mental health, needed both for mother and child.

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References

[1]. Buşneag, C., (2007). Kinetoterapia în obstetrico-ginecologie şi în afecţiunile abdominale. Editura Fundației România de Mâine, Bucureşti, p. 30.

[2]. https://ro.wikipedia.org/wiki/Graviditate, Visited at 25.09. 2015

[3]. Selby, A., (2003). Gimnastica Pilates pentru gravide. Exerciții fizice uşoare şi eficiente pentru perioada sarcinii şi pentru perioada postnatală. Editura Bic All, Bucureşti, p. 14.

[4]. http://sanatate.cugetliber.ro/boli-si-afectiuni/obstetrica-ginecologie/kinetoterapia-si-masajul-necesare-pentru-gravide/, Visited at 21. 09. 2015

[5]. Buşneag, C., (2006). Aprecierea eficienței mijloacelor kinetice complexe specifice trimestrului III de sarcină şi influența acestora asupra actului naşterii. Analele Universității Spiru Haret, Seria Educație Fizică, Sport şi kinetoterapie**,** Anul III, nr. 3, Editura Fundației România de Mâine, Bucureşti, p. 101-110.

[6]. Nayak, R., Virani, S., Gupta, C., Kumar, V., K., Narayan, A., Thunga, S., Mithra, P., P., (2015). Awareness of antenatal exercises among pregnant women in tertiary care centers, Mangalore, India. International Journal of Allied Medical Sciences and Clinical Research, Volume 3, Issue 2, p. 243-247, Available on www.ijamscr.com, Visited at 22.09.2015.

[7]. Tache, G. O., (2001). Ghid de medicină fizică şi recuperare medicală, Editura Scripta, Bucureşti, p. 259-260.

[8]. Wolfe, L., A., Davies, G., A., L., (2003). Canadian guidelines for exercise in pregnancy. Clin Obstet Gynecol, 46, p. 488-495.

[9]. Bartha, I., Vlădesccu, E., (2003). Exerciții de kinetoterapie efectuate în sarcină pentru prevenirea hiperlordozei. Analele UVT-Seria EFS, No. 5, Fascicola 2, p. 174-179.

[10]. Singh, N., Desai, O. P., (2007-2008). Prevention and management of low backache in pregnant women through the use of exercise program and education booklet. The Indian

Journal of Occupational Therapy, Vol. XXXIX, No. 3 (December 2007-March 2008), p. 65-72.
[11]. Sarfraz, M., Islami, D., Hameed, U., Danish, S., H., Ahmad, F., (2013). Role of Physical Therapy in antenatal care as perceived by the clients- a cross sectional survey on pregnant females attending antenatal OPD, Pakistan Journal of Medicine and Dentistry, Vol. 1 (01), p. 34-46.
[12]. Park, S., H., Kang, C., B., Jang, S., Y., Kim, B., Y., (2013). Effect of Kegel Exercise to Prevent Urinary and Fecal Incontinence in Antenatal and Postnatal Women: Systematic Review. Journal of Korean Academy of Nursing, 43, p. 420-430.
[13]. El Hamid, A., A., Azzam, H., F., Ismail, G., M., Gaafar, H., M., (2012). Effect of a Structured Antenatal Kegel Exercises Protocol on Labor Progress among Women Attending Antenatal Clinics. Egyptian Nursing Journal, No. 3, 2090-2210.
[14]. Morris, S., N., Johnson, N., R., (2005). Exercise during pregnancy: a critical appraisal of the literature. J Reprod med, Vol. 50, p. 181-188.
[15]. Evenson, K., R., Siega-Riz, A., M., Savitz, D., A., Leiferman, J., A, Thorp, J., M., Jr, (2002). Vigorous leisure activity and pregnancy outcome. Epidemiology , 13, p. 653-659.
[16]. Schmidt, M., D., Freedson, P., S., Pekow, P., Roberts, D., Sternfeld, B. et al., (2006). Validation of the Kaiser Physical Activity Survey in pregnant women. Medicine Science Sports Exercise, 38, p. 42-50.
[17]. Hinton, P., S., Olson, C., M., (2001). Predictors of pregnancy-associated change in physical activity in a rural white population. Matern Child Health J , 5, p. 7-14.
[18]. Clapp, J., F., (2000). Exercise during pregnancy. A clinical update. Clin Sports Med., 19, p. 273-286.
[19]. May, L., E., Glaros, A., Yeh, H., W., Clapp, J., F., Gustafson, K., M., (2010). Aerobic exercise during pregnancy influences fetal cardiac autonomic control of heart rate and heart rate variability. Early Hum Dev, 86, p. 213-217.
[20]. May, L., E., Suminski, R., R, Langaker, M., D., Yeh, H., W., Gustafson, K., M., (2012). Regular maternal exercise dose and fetal heart outcome. Medicine&Science Sports&Exercise 44, p. 1252-1258.
[21]. Zeană, C., (2002). Sarcina şi bolile cardiovasculare. Editura Medicală, Bucureşti, p. 5.
[22]. http://www.desprecopii.com/info-id-448-nm-Travaliul-de-la-A-la-Z, Visited at 26.09. 2015.
[23]. Albu, C., Albu, A., Vişan, A., (2008). Universul de mişcare al copilului mic 0-3 ani născut la termen sau prematur. Editura Polirom, Bucureşti, p. 22- 23.
[24]. ACOG Committee Obstetric Practise. ACOG Committee Opinion, (2002). Number 267, January 2002: Exercise during pregnancy and the postpartum period . Obstet Gynecol. , Vol 99, p.171-173.
[25]. Oraviţan, M., (2006). Primary and secondary kinetoprophilaxy in prenatal period. Revista Română de kinetoterapie. Nr. 17, Editura Universităţii din Oradea, p. 104-115.
[26]. Baciu, N., (2004). Diete şi mişcare pentru viitoare mămici. Editura Cartea de buzunar, Bucureşti, p. 82-88.
[27]. Nussio, E., M., (2009). Yoga pentru femei, Editura Teora, Bucureşti, p. 114.
[28]. Pilates, J., H., (2007). Metoda Pilates. Editura Teora, Bucureşti, p. 7.
[29]. Traczinski, C., G., Polster, R., S., (2010). Pilates. Naumann & Göbel Verlagsgesellschaft mbH, Köln, Germany, p. 11
[30]. Eisen, I., (2014). Anatomy of fitness: Pilates. Hinkler Books Pty ltd, Australia, p. 8-13
[3]1. Nicolau, E., (2003). Rolul şi importanţa kinetoterapiei în combaterea efectelor negative induse de modificările din timpul sarcinii-prezentare de caz. Citius, Altius, Fortius. Revistă de Specialitate a Facultăţii de Educaţie fizică şi Sport, Universitatea din Piteşti, p. 113-121.
[32]. Ayanniyi, O., Sanya, A.,O., Ogunlade, S.,O., Oni-Orisan, M.,O., (2006). Prevalence and Pattern of Back Pain among Pregnant Women Attending Ante-Natal Clinics in Selected Health Care Facilities. African Journal of Biomedical Research, Vol. 9, 149 – 156.
[33]. Pivarnik, J., Chambliss, H., Clapp, J., Dugan, S., Hatch, M., Lovelady, C., Mottola, M. and Williams, M., (2006). Impact of Physical Activity during Pregnancy and Postpartum on Chronic Disease Risk. Official Journal of the American College of Sports Medicine.Available on http://www.acsm-msse.org, Visited at 21.09.2015.