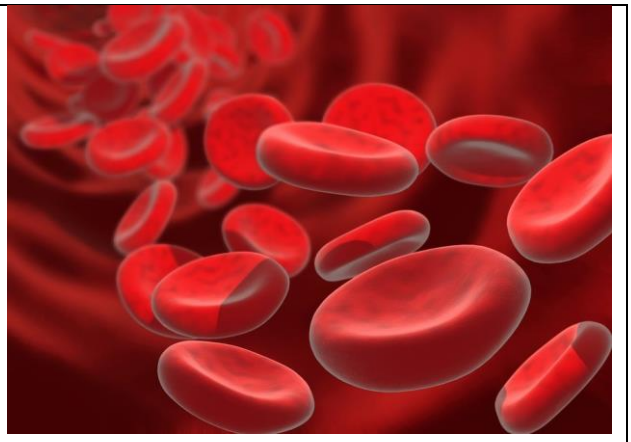
Your Guide to Starting Exercise during Pregnancy

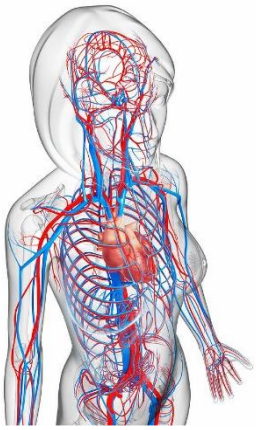
PHYSIOLOGICAL CHANGES DURING PREGNANCY

Before starting exercise during pregnancy, it is imperative to become familiar with the physiological changes that occur during pregnancy. This is especially important when performing exercise to ensure that both your body and baby's needs are being met.

1. The mother undergoes physiological changes which affect every organ system in the body and increase blood volume by about 1.5 L. Due to the increase in red cell mass, pregnancy causes a two-to three-fold increase in the requirement for iron. This as a result forces a decrease in haemoglobin concentration. An *increased requirement for iron is to maintain haemoglobin synthesis* in both the mother and the foetus and for producing enzymes which play a vital role in the formation of ATP – the primary source of our energy (Ramsay, 2010). This explains why it is necessary for pregnant women to ***consume the required additional amount of iron, especially if engaging in any type of physical exercise.*** This is because the main role of iron is to transport oxygen in the blood to the tissues and it ensures that our muscles are working properly. It also helps the body convert carbohydrates into energy during exercise.



2. Changes in the cardiovascular system begin early in pregnancy, such that by eight weeks of gestation, the **cardiac output would have already increased by 20%.** The primary event of this sudden change in the cardiovascular system is peripheral vasodilatation (side effects of vasodilation include chest pain, heart palpitations, low blood pressure and dizziness). **A significant increase in oxygen demand** during pregnancy happens because of the 15% increase in the metabolic rate, a 20% increase in the consumption of oxygen and an overall 40% increase in minute ventilation.



When exercising during pregnancy, the safest and most productive activities which will also improve your ***cardiovascular system*** include ***swimming, brisk walking, indoor stationary cycling, step or elliptical machines, and low-impact aerobics***. These activities carry little risk of injury, benefit your entire body, and can be continued until birth.

3. Skeletal and bone density changes also happen during pregnancy. **Bone turnover** (formation of calcium to facilitate bone formation) is **low in the first trimester** and **increases in the third trimester when foetal calcium needs increase**. This change reflects the need for the maternal skeleton to be resistant to bending forces and biochemical stresses needed to carry the growing foetus. ***Exercise during pregnancy maintains and increases bone mineral density*** *which as a result, helps* ***support the extra weight being carried,*** *mostly towards the end of the pregnancy, and* ***minimize any back and other aches and pain*** *which the mother might experience* (To and Wong, 2012).

OTHER MUSCULOSKELETAL CHANGES IN PREGNANCY

- **Exaggerated lordosis** of the lower back, **forward flexion of the neck** and **downward movement of the shoulders**.
- **Joint laxity** in the anterior and longitudinal ligaments of the **lumbar spine**.
- **Widened and increased mobility** of the sacroiliac joints and *pubic symphysis* (cartilaginous joint located between the left and right **pubic bones** near the midline of the body).

THE RISKS AND DANGERS ASSOCIATED WITH PREGNANCY AND EXERCISE

a) **Premature contractions:** Premature contractions of the cervix can potentially be induced by the hormones that are stimulated by exercise.

b) **High Glucose Levels**: Increased glucose consumption from working muscles could affect foetal glucose levels which increases risks of delivering a large-for-gestational-age infant.

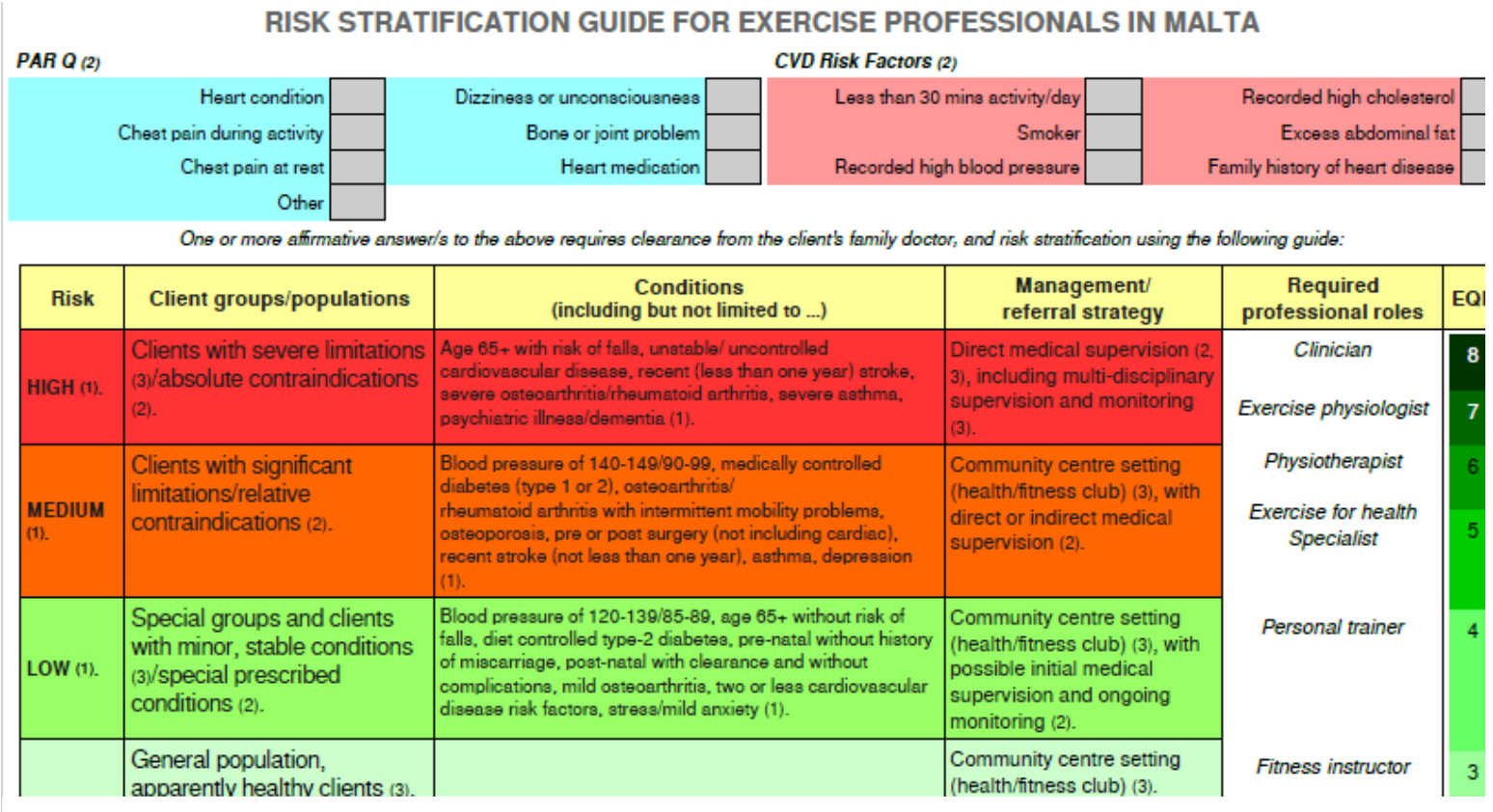
c) **Decreased Oxygen and Nutrient delivery to the placenta**: Exercise causes blood to be redistributed from internal organs to skeletal muscles and as a result reduces oxygen and nutrient delivery to the placenta.

d) **Maternal Thermoregulation**: Participating in vigorous exercise in high temperature environments will challenge maternal thermoregulation.

e) **Heavy weight training**: The biggest risk to pregnant women lifting heavy weights is abdominal pressure and stress put on the uterus.

The above points must not discourage the participation of exercise during pregnancy. In fact, the Irwin and Morgan Stratification Risk Tool below (figure 1), stratifies **pre-natal women** (without history of miscarriage) as having a **low risk** in performing **safe** and **effective exercise**. However, those pregnant women with several conditions (namely cardiovascular disease, hypertension/hypotension, diabetes etc.), are advised to seek their GP before starting exercise, since they are stratified at a higher risk than those pregnant women who are void of conditions.

Furthermore, you might want to consider a physical trainer to purposefully plan and design an exercise programme that meets your very own needs and wants. It is ideal for all pregnant to consider personal training in order for them to safely and effectively remain fit and lower the tendency of the above risks by having all the important necessities during exercise for pregnancy included in the programme.



RISK STRATIFICATION GUIDE FOR EXERCISE PROFESSIONALS IN MALTA

PAR Q (2)

Heart condition		Dizziness or unconsciousness	
Chest pain during activity		Bone or joint problem	
Chest pain at rest		Heart medication	
Other			

CVD Risk Factors (2)

Less than 30 mins activity/day		Recorded high cholesterol	
Smoker		Excess abdominal fat	
Recorded high blood pressure		Family history of heart disease	

One or more affirmative answer/s to the above requires clearance from the client's family doctor, and risk stratification using the following guide:

Risk	Client groups/populations	Conditions (including but not limited to ...)	Management/ referral strategy	Required professional roles	EQ
HIGH (1).	Clients with severe limitations (3)/absolute contraindications (2).	Age 65+ with risk of falls, unstable/ uncontrolled cardiovascular disease, recent (less than one year) stroke, severe osteoarthritis/rheumatoid arthritis, severe asthma, psychiatric illness/dementia (1).	Direct medical supervision (2, 3), including multi-disciplinary supervision and monitoring (3).	*Clinician*	8
				Exercise physiologist	7
MEDIUM (1).	Clients with significant limitations/relative contraindications (2).	Blood pressure of 140-149/90-99, medically controlled diabetes (type 1 or 2), osteoarthritis/ rheumatoid arthritis with intermittent mobility problems, osteoporosis, pre or post surgery (not including cardiac), recent stroke (not less than one year), asthma, depression (1).	Community centre setting (health/fitness club) (3), with direct or indirect medical supervision (2).	*Physiotherapist*	6
				Exercise for health Specialist	5
LOW (1).	Special groups and clients with minor, stable conditions (3)/special prescribed conditions (2).	Blood pressure of 120-139/85-89, age 65+ without risk of falls, diet controlled type-2 diabetes, pre-natal without history of miscarriage, post-natal with clearance and without complications, mild osteoarthritis, two or less cardiovascular disease risk factors, stress/mild anxiety (1).	Community centre setting (health/fitness club) (3), with possible initial medical supervision and ongoing monitoring (2).	*Personal trainer*	4
	General population, apparently healthy clients (3).		Community centre setting (health/fitness club) (3).	*Fitness instructor*	3

Figure 1: The Irwin and Morgan Stratification Risk Tool

Further online tools will help you understand better whether you are physically ready for exercise during pregnancy. These are usually used by physical trainers to screen their clients prior to designing an exercise programme. These are presented in a form of a checklist and identify several health challenges individuals might encounter during exercise. After carrying out the checklist, you will be given a score that indicates whether you have or do not have a higher probability of risk during exercise. These questionnaires are reliable and helpful to ensure you exercise safely during pregnancy by taking several precautionary steps which might be necessary for several mothers. The tools include the following;

1. ***PARmed-X* for Pregnancy** is a guideline for health screening prior to participation in prenatal exercise. It consists of a convenient checklist and prescription for use by health care providers to evaluate pregnant patients who want to enter a prenatal fitness program and for ongoing medical supervision of the exercising pregnant women.
2. The ***Par-Q documentation*** is similar to the Irwin and Morgan Stratification Risk Tool but is presented with a checklist and gives a resulting score. Keep in mind that your level of risk during exercise for pregnancy may alter by time if you happen to experience drastic physiological changes as a result of exercise, such as hypotension or shortness of breath.

   Example: If you were stratified as having a low risk prior to starting your exercise programme, but then you start to experience dizziness during the sessions, that means that you will have to alter to a medium stratified risk, and thus take the necessary precautions when performing exercise.

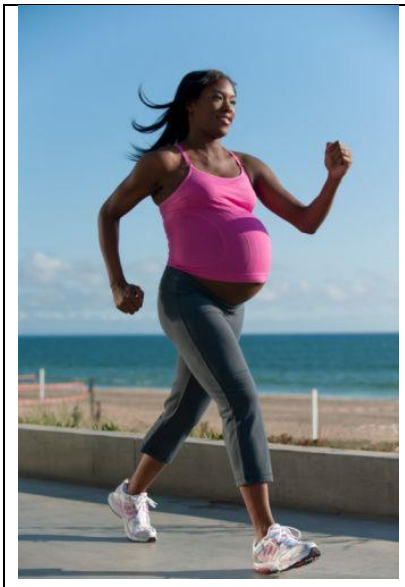
IDEAL EXERCISES FOR DURING PREGNANCY

1. **Pelvic floor muscle (Kegel) exercises** for assisting labour.

Examples of Kegel exercises;

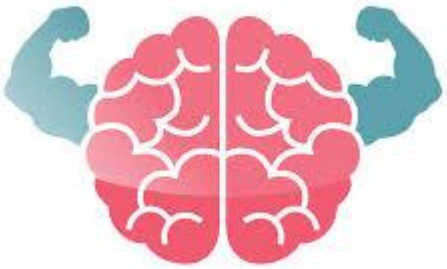
- *Sumo squats*
- *Lunges*
- *Holding bridge position*
- *Donkey kicks*
- *Single leg crunches*

2. **Light aerobic training** such as swimming, walking, and stationary cycling.
3. **Light to moderate resistance training** to target all other muscle groups to remain fit and to find it easier to get back into shape after labour. A physical trainer will provide you with the ideal exercise programme that will match both your pregnancy needs and any desired body goals you might want to achieve.

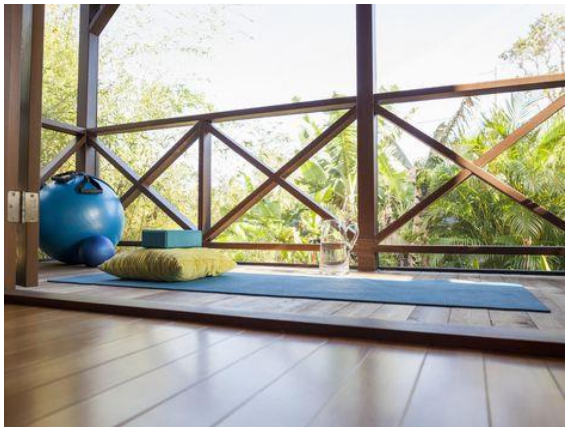


N.B. If exercising without a prescribed programme, make sure that the **exercises you perform are applicable for the trimester period you are in** to prevent any possible harm to your body and on your developing baby. Exercises which apply for the first trimester might not apply for the third trimester due to safety reasons. Harm during exercise could arise due to difficult/ heavy weight bearing exercises, excessive training, and incorrect posture/technique of the exercise performed.

SAFETY PROCEDURES FOR EXERCISE DURING PREGNANCY



1. Become knowledgeable about the normal physiological effects that are likely to occur during the sessions (such as a raise in heart rate, tiredness and redness). It is possible that you feel yourself overheating, so it is advised that you dress light clothing and drink regular sips of water to remain hydrated during exercise. It is important to stop training immediately if symptoms such as dizziness or shortness of breath start to be felt.



2. The environment where the exercise is going to be performed must be checked to ensure safety. The following should be checked prior to starting exercise (some might not be applicable for outdoor exercise).
   - Updated first aid kit
   - The possibility of sweaty or slippery floors
   - Windows are opened regularly to circulate the air
   - Fan for circulation
   - Have a gym mat
   - Preferably exercise with company

3. Working out on an empty stomach is not normally going to hurt you, but when you're pregnant, your body's already putting lots of energy toward making a baby. Getting something light and full of nutrients in your stomach before exercise will give you extra fuel and make sure you have got the required energy needed throughout your workout.

TESTS TO BE TAKEN PRIOR AND DURING EXERCISE DURING PREGNANCY

		
Healthy gestational weight gain	**Blood pressure & pulse**	**Temperature**

Checking for healthy gestational weight gain will ensure that you are adding the appropriate weight which occurs naturally during pregnancy. In addition, checking your blood pressure, temperature and pulse are suitable for ensuring constant health patterns both before and after the sessions, which safeguards that you are fit for performing exercises on that day and at that very moment. The purpose behind these tests are for them to be carried out regularly and to keep records of them so you can easily identify any unusual alterations in weight gain, blood pressure, temperature and pulse.

PROSPECTIVE FITNESS GOALS YOU SHOULD AIM FOR DURING PREGNANCY

A **HEALTHY GESTATIONAL WEIGHT GAIN*** TO EASILY GET BACK IN SHAPE AFTER PREGNANCY

A healthy gestational weight gain (figure 2) ranges between 11kg and 15kg for women who have an average weight. Clapp and Little (1995) found that pregnant women who maintain physical activity levels gain 20% less weight while pregnant than those who remain inactive. Similarly, Barakat et al. (2009) established how **resistance training** during pregnancy substantially controlled maternal weight gain. Furthermore, Barakat et al. (2009) found that maintaining a healthy gestational weight gain and exercising during pregnancy will make it easier to get back in shape after pregnancy. Prenatal and postnatal exercise is significant for controlling weight gain because postpartum weight retention shows an inverse correlation with a woman's degree of prenatal physical activity and may possibly even increase the risk of breast cancer.

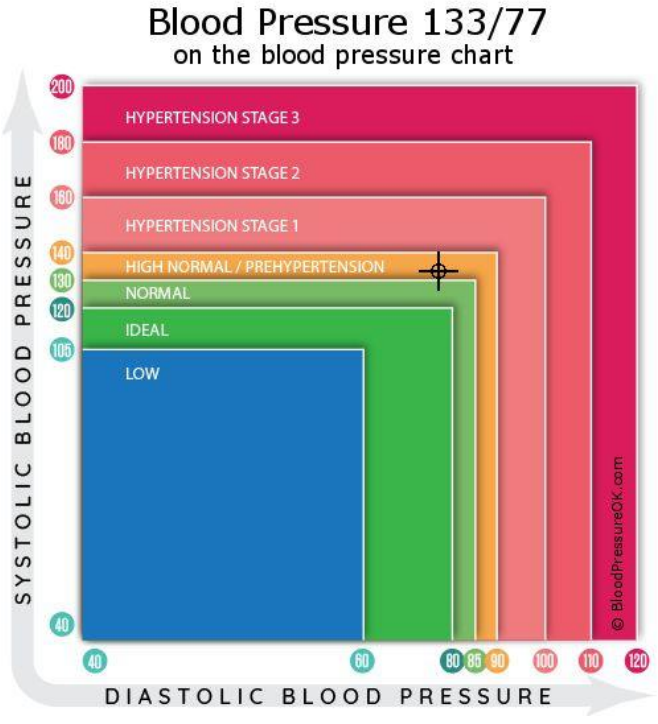
*Gestational weight gain – the amount of weight gained during pregnancy

Pre-pregnancy weight	Recommended weight gain
Underweight (BMI under 18.5)	28 to 40 lbs. (about 13 to 18 kg)
Normal weight (BMI 18.5 to 24.9)	25 to 35 lbs. (about 11 to 16 kg)
Overweight (BMI 25 to 29.9)	15 to 25 lbs. (about 7 to 11 kg)
Obesity (BMI 30 or more)	11 to 20 lbs. (about 5 to 9 kg)

Figure 2: Recommended Gestational Weight Gain

A **WELL-MAINTAINED BLOOD PRESSURE** WITHOUT THE NEED OF VIGOROUS TRAINING

Pregnancy causes hormone shifts as well as psychological and physical changes. This can bring on stress, which can make high blood pressure harder to manage. Hypertensive disorders of pregnancy, including preeclampsia, lead to preterm delivery, morbidity and mortality of the mother, foetus, and neonate, and are a predictor of the development of chronic maternal hypertension, cardiovascular disease, and renal disease. In 2011, Schoenfeld found that dynamic resistance training provides physiological and psychological maternal benefits and helps to improve functional ability.



A WELL-PREPARED **LABOUR**

In 2018, Schreiner et al complied a systematic review of pelvic floor interventions during pregnancy and found that **pelvic floor muscle training improved childbirth related parameters and pelvic floor symptoms**. The largest study investigating pelvic floor muscle training reported a significant reduction in the duration of the second stage of labour and this intervention also reduced the incidence of urinary incontinence.

ENSURING **HEALTHY FOETAL AND INFANT DEVELOPMENT**

Misra et al. (2011) established how **women with excessive gestational weight gain who deliver a macrocosmic new-born tend to have higher saturated lipid concentrations** (a new-born with macrosomia weighs greater than 4000g). In the long term, infants who are large for gestational age are more likely than other infants to be obese in childhood, adolescence and early adulthood, and are inherently at higher risk of cardiovascular and metabolic complications in adulthood.

REMAINING **PHYSICALLY** AND **MENTALLY** HEALTHY

Many studies show that **supervised programmes during pregnancy improve mental health and quality of life**. Exercise and improved mental health are also known for **lowering the possibility of postpartum depression.**

Being fit during pregnancy cares for, supports and appreciates all the extraordinary work the female body can do!

THE BEST EXERCISES DURING PREGNANCY AND WHY

LUNGES 	• Strengthens the thighs, hip flexors, hamstrings and gluteal muscles. • Strengthening these muscles support the extra weight that is carried during pregnancy, minimizing any back and other aches you might experience. • Encourage a strong, fit physique, making it much easier to get back into shape after pregnancy.
SQUATS 	• Build strength and stamina in the lower extremities and maintain mobility in the hips. • Low-impact exercise that elevates the heart rate and keeps the cardiovascular system strong. • Maintain balance and coordination as the centre of gravity shifts with the expanding belly. • Strong glutes will help stabilize the pelvis and further reduce the experience of lower back pain.

During labour, you may decide to stay in a squat position to help you cope with contractions during labour.

SPECIFIC KEGEL EXERCISES	
 Bridge Hold	• Holding the bridge position can help strengthen the muscles that support the bladder, uterus, and bowels.
 Single-leg Glute Bridge	• By strengthening these muscles during pregnancy, the ability to relax and control the muscles in preparation for labour and birth will develop.

THE END

Par-Q Documentation: http://eparmedx.com/wp-content/uploads/2013/03/January2020PARQPlusFillable.pdf

PARmed-X for Pregnancy: http://www.csep.ca/cmfiles/publications/parq/parmed-xpreg.pdf

References

- Barakat R, Lucia A, and Ruiz JR (2009). "*Resistance exercise training during pregnancy and newborn's birth size*": A randomised controlled trial. Int J Obes (Lond)
- Clapp JF and Little KD (1995). "*Effect of recreational exercise on pregnancy weight gain and subcutaneous fat deposition*". Med Sci Sports Exerc
- Misra, Trudeau, and Perni (2011). "*Maternal serum lipids during pregnancy and infant birth weight: the influence of prepregnancy*" BMI. Obesity
- Ramsay, (2010). "*Normal hematological changes during pregnancy and the puerperium*". The Obstetric Hematology Manual
- Retrieved from https://healthengine.com.au/info/benefits-and-risks-of-exercise-during-pregnancy
- Retrieved from https://www.open.edu/openlearncreate/mod/oucontent/view.php?id=39&printable=1
- Schoenfeld (2011). "*Resistance training during pregnancy: safe and effective program design*". Strength & Conditioning Journal
- Schreiner et al., (2018). "*Systematic review of pelvic floor interventions during pregnancy*" International Journal of Gynecology & Obstetrics
- To, W.W. and Wong, M.W., (2012). "*Bone mineral density changes during pregnancy in actively exercising women as measured by quantitative ultrasound*" Archives of gynecology and obstetrics,