

**PHYSICAL ACTIVITY AND ITS ASSOCIATED  
FACTORS AMONG PREGNANT WOMEN IN AN  
URBAN HEALTH CLINIC IN KUANTAN, PAHANG**

**BY**

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A thesis submitted in fulfilment of the requirement for the  
degree of Master of Medical Sciences (Public Health)

**Kulliyyah of Medicine  
International Islamic University Malaysia**

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## ABSTRACT

Co-morbidities such as obesity, gestational diabetes and pregnancy induced hypertension during pregnancy can be dangerous to mother and fetus. Regular physical activity during pregnancy not only maintains maternal and fetal wellbeing, but it also maintains physical fitness and brings various health benefits. However, many women reduced their physical activities during pregnancy. The objective of this study was to measure the prevalence, level and factors contributing to physical activity among pregnant women during pregnancy and identify the barriers that could prevent a pregnant woman from doing physical activities. This was a cross-sectional study involving 168 pregnant women aged 18-35 years between 12-35 weeks of gestation attended a primary health clinic in Kuantan, Pahang. Their socio-demographic characteristics were recorded, and three sets of questionnaires were used; validated Malay version of IPAQ (short-form) for assessing physical activity, DASS -21 Malay version for evaluating psychological symptoms and a pre-tested questionnaire for assessing barriers for physical activity. Chi-square test, Fishers exact test, Independent t-test and multiple logistic regression were conducted using IBM SPSS Statistics version 23.0. Significant level was set at p value <0.05. The mean (SD) age was 28.0(3.6) and majority of them were Malay ethnicity from B40 group. Two third (74.4%) had tertiary education and 66.7% were working mothers. More than half (53.0%) of the participants were overweight and obese. Among 168 respondents, 24.4% had moderate level of physical activity, but the majority (76.0%) had low-level physical activity. Likewise, about 78.6% were physically inactive and only 22.0% physically active during pregnancy. For the barriers, we found that 58.0% of the participants had leg cramp, 63.1% felt fatigue, 80.4% had backache and 46.4% had epigastric discomfort. We have not found any significant factors associated with physical activity level. Majority of the pregnant women conducted low level of physical activity and less than quarter of the pregnant women were physically active. Physical barriers such as leg cramp, backache, fatigue and epigastric discomfort could prevent pregnant women from conducting physical activities.

## خلاصة البحث

الأمراض المصاحبة مثل السمنة وسكري الحمل وارتفاع ضغط الدم الناجم عن الحمل أثناء الحمل يمكن أن تكون خطرة على الأم والجنين. لا يحافظ النشاط البدني المنتظم أثناء الحمل على صحة الأم والجنين فحسب ، بل يحافظ أيضاً على اللياقة البدنية ويجلب فوائد صحية مختلفة. ومع ذلك ، قل العديد من النساء من أنشطتهن البدنية أثناء الحمل. كان الهدف من هذه الدراسة هو قياس معدل الانتشار والمستوى والعوامل التي تساهم في النشاط البدني بين النساء الحوامل أثناء الحمل وتحديد العوائق التي يمكن أن تمنع المرأة الحامل من القيام بالأنشطة البدنية. كانت هذه دراسة مقطعية شملت 168 امرأة حامل تتراوح أعمارهن بين 18 و 35 عامًا بين 12-35 أسبوعًا من الحمل حضرن عيادة صحية أولية في كوانتان ، باهانج. تم تسجيل خصائصهم الاجتماعية والديموغرافية ، واستخدمت ثلاث مجموعات من الاستبيانات ؛ نسخة الملايو المصدق عليها من IPAQ (شكل قصير) لتقييم النشاط البدني ، نسخة الملايو DASS-21 لتقييم الأعراض النفسية واستبيان تم اختباره مسبقًا لتقييم عوائق النشاط البدني. تم إجراء الاختبار كاي سكوير و الاختبار الدقيق فشروا اختبار المستقل تي ، والانحدار اللوجستي متعدد باستخدام SPSS إصدار 23.0 ، تم تعيين المستوي المهم عندما  $P < 0.05$ . كان متوسط العمر (SD) 28 سنة (3.6) وكان معظمهم من أصل ماليزي من مجموعة (B40). ثلثهم (74.4%) كانوا حصلوا علي تعليم جامعي و (66.7%) كانوا امهات عاملات . كان أكثر من نصف المشاركين (53.0%) يعانون من زيادة الوزن والسمنة. من بين 168 مستجيباً ، 24.4% لديهم مستوى معتدل من النشاط البدني ، لكن الغالبية (76.0%) لديهم نشاط بدني منخفض المستوى فقط 22% يمارسون نشاط بدني اثناء الحمل. بالنسبة للحواجز وجدنا 58% من المشاركين يعانون من تقلصات و 63.1% يشعرون بالتعب و 84% يعانون من الالم الظهر و 46.4% يعانون من الانجهاز في المعدة. لم نعتز علي أي عوامل مهمه مرتبطة بمستوي النشاط بالجسم. تمارس اغلب النساء الحوامل مستوي منخفض من النشاط البدني وأقل من ربع النساء الحوامل كن نشيطات بدنيا. ممكن ان تمنع الحواجز مثل تقلصات الساق والام الظهر والتعب وعدم الراحة في المنطقة المعدة النساء الحوامل من ممارسة الانشطة البدنية.

## APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Medical Sciences (Public Health).

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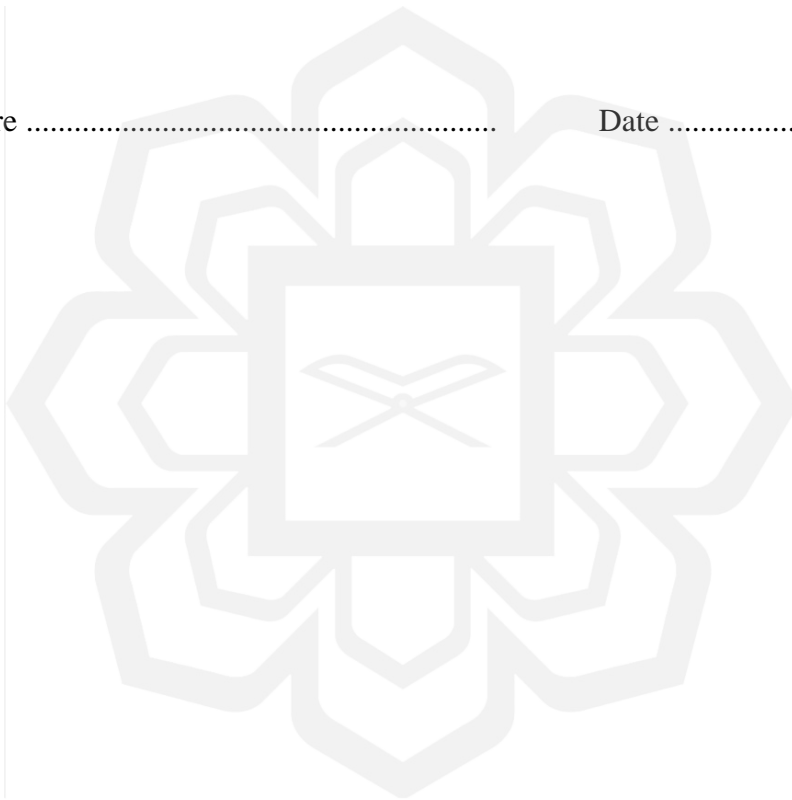
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## DECLARATION

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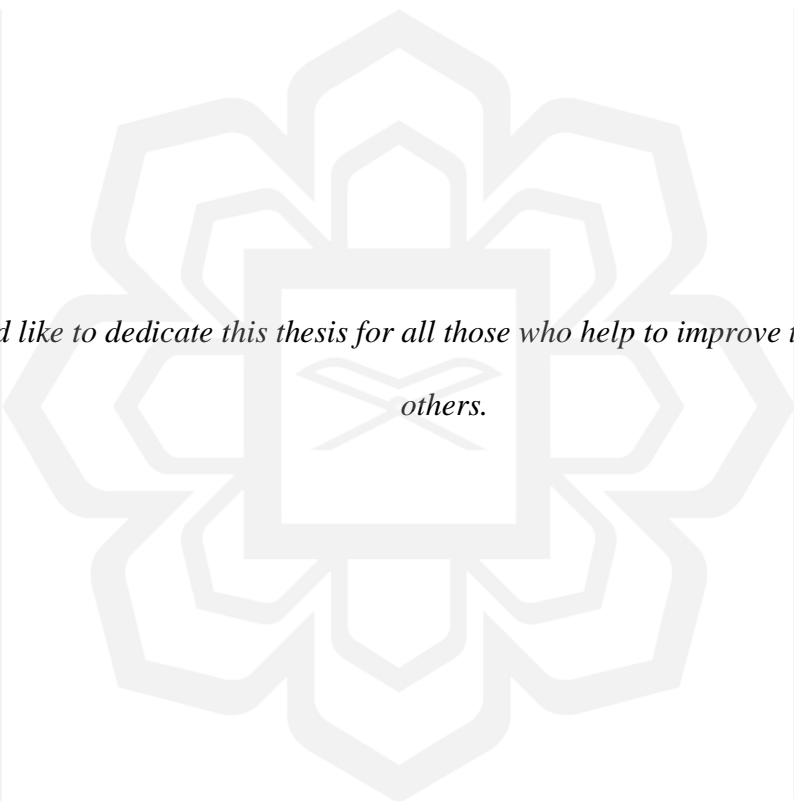
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*I would like to dedicate this thesis for all those who help to improve the lives of the  
others.*

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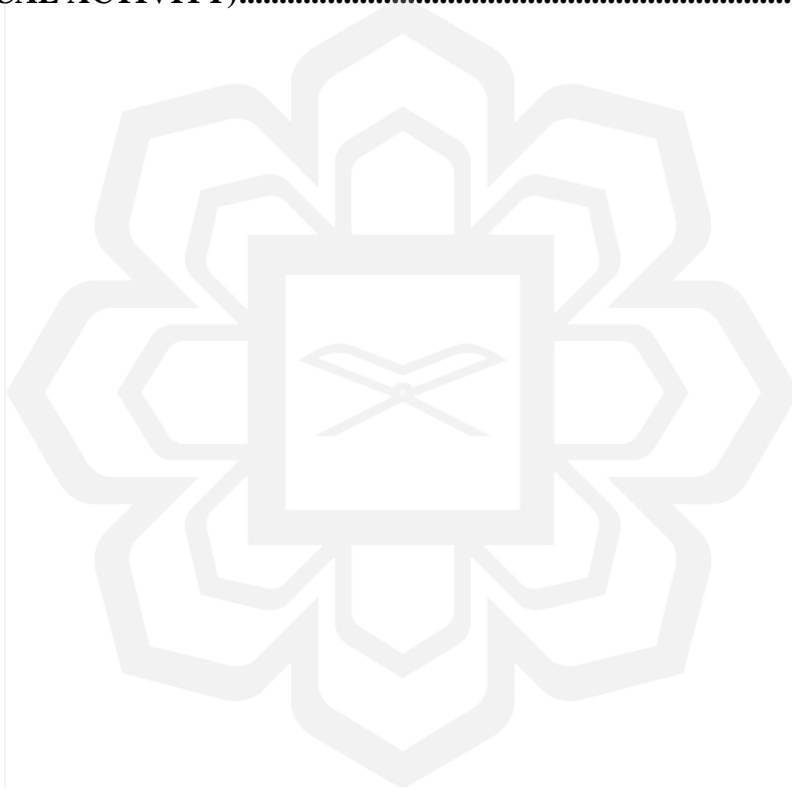
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## LIST OF SYMBOLS

%	Percentage
+	Plus
-	Minus
=	Equal to
>	More than
<	Less than
(	Left parenthesis
)	Right parenthesis
,	Comma
.	Full stop
:	Colon
;	Semicolon

## LIST OF ABBREVIATIONS

ACOG	American College of Obstetricians and Gynecologists
BMI	Basal Metabolic Index
MET	Metabolic Equivalent of Task
WHO	World Health Organization
GDM	Gestational Diabetes Mellitus
GWG	Gestational Weight Gain
DVT	Deep Vein Thrombosis
NICU	Neonatal Intensive Care Unit
VO <sub>2</sub>	Volume of Oxygen
IPAQ-SF	International Physical Activity Questionnaire Short Form
DASS	Depression, Anxiety, Stress scale
PPAQ	Pregnancy Physical Activity Questionnaire

# CHAPTER ONE

## INTRODUCTION

### 1.1 BACKGROUND OF THE STUDY

Pregnancy, also known as gestation, is a state of carrying and developing of one or more embryo or fetus inside a woman's body after sexual intercourse or assisted reproductive technology (Gupta, 2011). Pregnancy is generally divided into three trimesters; the first trimester begins from week one through 12 weeks, the second trimester is from week 13 through 28 weeks and last or third trimester is from 29 weeks through 40 weeks (Gupta, 2011). Extensive changes happen during pregnancy at the level of physical, physiological, and psychological and those alterations are required to secure fetal wellbeing in the mother's body (Barakat, Perales, Garatachea, Ruiz, & Lucia, 2015). Pregnancy is a period of identifying, modifying, and adaptation of habits and behaviors at the level of healthy lifestyles (Poppel, Owe, & Santos-rocha, 2019). Therefore, it is necessary that pregnant woman should be motivated to learn and understand the advantages of healthy and active lifestyle for physical and psychological well-being, which can have long term consequences on the health of child as well (C. W. H. Chan, Au Yeung, & Law, 2019; Mazur, Machaj, & Mazur, 2020).

Lack of physical activity and consumption of unhealthy diet can alter the proportion of insulin receptors in muscles and adipose tissue which can lead insensitivity of those receptors to insulin action and cause hyperglycemia and obesity. Obesity and lack of regular exercise have been associated with increase prevalence of diabetes mellitus in women of reproductive age and during pregnancy (de Oliveira Santini, dos Santos Imakawa, Duarte, Quintana, & Moisés, 2019).

Furthermore, gestational diabetes mellitus is associated with high risk complications, such as caesarean section, preclampsia, fetal macrosomia, neonatal hypoglycemia, and jaundice, and developing type 2 diabetes later in life for both mothers and offspring. However, physical activity is one of the modifiable factors which has direct and indirect impact on insulin sensitivity and glucose homeostasis (G. R. do Nascimento, Borges, Figueiroa, Alves, & Alves, 2019; Natarajan Padmapriya et al., 2017).

Physical activity is important in pregnancy because it can improve maternal and fetal health outcomes (Chan et al., 2019; Niño et al, 2018). There are many guidelines available that recommend regular physical activity during pregnancy, such as Malaysian Guideline for Physical Activity, Australian Guideline for Physical Activity for Pregnant Women, Canadian Guideline for Physical Activity throughout Pregnancy, and American College of Gynaecology (ACOG) Guideline. All guidelines recommends that pregnant women should engage in 30 minutes of physical activity of at least five days per week in the absence contraindications (Artal, 2016; Committee on Obstetric Practice from the American College of Obstetricians and Gynecologists, 2015; Evenson et al., 2014; Gerrard, 2020; Mottola et al., 2018) It was found that women who are physically active before, during, and after pregnancy will have a reduced risk of getting complications such as low back pain, depressive symptoms, pre-eclampsia, gestational diabetes, preterm delivery, and emergency caesarean section, during pregnancy and in the post-partum period (Dagfinn Auugstad, Henriksen, & Tonstad, 2014 ; D. Aune, Schlesinger, Henriksen, Saugstad, & Tonstad, 2017).

Furthermore, regular physical activity during pregnancy could play an important role in the prevention of excessive gestational weight gain and associated risk of adverse pregnancy outcomes (Padmapriya et al., 2015; Harrison et al., 2018). It is known that

excessive weight gain and increase basal metabolic index (BMI) during pregnancy were associated with increased risk of, stillbirth, neonatal, perinatal, and infant death (McGee et al., 2018; Harrison, Taylor, Shields, & Frawley, 2018).

## **1.2 JUSTIFICATION OF THE STUDY**

The prevalence of being physically active during pregnancy is noted to be low among Asian pregnant women. Studies conducted in Singapore and China found that around 21.8% of the pregnant women were physically active during pregnancy, and only 11.0% met the ACOG guidelines (Godfrey et al., 2015; Natarajan Padmapriya et al., 2017; Yan Zhang et al., 2014).

Few studies have been conducted regarding physical activity during pregnancy in Malaysia.. A study in 2016 found that pre-pregnancy BMI and physical activity were associated with gestational weight gain among Malaysian mothers (Yong, Mohd Shariff, Koo, & Binti Sa'ari, 2016). Another study by Fadzil et al, in 2018, on predictors of weight retention during postpartum period among urban Malaysian mothers, reported that gestational weight gain and being less physically active after delivery could be the most significant predictors of postpartum weight retention (Fadzil et al.,2018). However, this study did not include pregnant women but emphasized on controlling gestational weight gain and being physically active in pre-pregnancy, during pregnancy and postpartum period.

Ministry of Health Malaysia produced their own manual for exercise during antenatal and postnatal period (perinatal care manual 3rd addition) to be taught to the pregnant women at health clinic during antenatal class. However, it seems does not increase the physical activity among pregnant women and we could not find any data regarding prevalence of physical activity among pregnant women in Malaysia as well.

To the best of our knowledge, limited studies about physical activities were conducted among pregnant women in Malaysia. Therefore, further study needs to be conducted to determine the prevalence and identify the factors associated with physical activity during pregnancy. The result of this study will provide baseline information regarding physical activity; the prevalence, level and associated factors for physical activity among pregnant women in a selected area in Malaysia. By getting those information, it is hope that it could be the basis and guidance for further studies in the future and for the local authority or Ministry of Health to conduct or provide any measures or intervention programs for the betterment of the health of pregnant mothers in Malaysia.

### **1.3 RESEARCH OBJECTIVES**

#### **1.3.1 General Objective**

To assess the physical activity during pregnancy and its associated factors among pregnant women in an urban area in Kuantan, Pahang Malaysia.

#### **1.3.2 Specific Objectives**

- i. To measure the level of physical activity among pregnant women.
- ii. To measure the prevalence of physical activity among pregnant women.
- iii. To determine the association between socio-demographic characteristics and psychological symptoms with the level of physical activity among pregnant women.
- iv. To identify physical barriers toward physical activity among pregnant women.

#### **1.4 RESEARCH QUESTIONS**

- i. What is the level of physical activity among pregnant women?
- ii. What is the prevalence of physical activity among pregnant women?
- iii. What are the factors associated with the level of physical activity among pregnant women?
- iv. What are the physical barriers toward physical activity among pregnant women?



## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 PHYSICAL ACTIVITY

Physical activity is defined as any bodily movement produced by the contraction of skeletal muscles that result in a substantial increase in caloric requirements over resting energy expenditure (Caspersen, Powell, & Christenson, 1985; Rochmis, 1971; World Health Organization (WHO), 2020). Whereas, exercise, is a subtype of physical activity that can be planned, structured, and repetitive bodily activity in order to maintain and improve physical fitness (Caspersen, Powell, & Christenson, 1985).

Physical activity in daily life can be categorized into occupational, sports, conditioning, household or other activities (Carl J. Casperson, Kenneth E. Powell, 1985) or simpler category; physical activity while at work, leisure or sleeping (Montoye, H.J (1975) in Carl J. Casperson and Kenneth E. Powell, (1985)). Whereas, the intensity of physical activity can be divided into three levels; low/light, moderate and high/vigorous intensity (ACSM, 2018).

In general population including pregnant and postpartum women, almost all guidelines recommend that all healthy adults aged 18-65 year old should improve their health through regular physical activity (Committee on Obstetric Practice from the American College of Obstetricians and Gynecologists, 2015; Evenson et al., 2014; World Health Organization (WHO), 2020) Regular physical activity means, moderate intensity of aerobic activity, which perform by individuals for 30 minutes on five days per week or accumulated of  $\geq 150$  minutes per week; or vigorous intensity for 20 minutes on three days per week ( $\geq 75$  minutes per week), or a combination of moderate

and vigorous intensity exercise to achieve a total energy expenditure of  $\geq 500$ -1000 MET min per week. (Haskell, 1978, Garber et al., 2011). However, pregnant and postpartum women and persons with cardiac problems should take extra precautions and seek medical advice before conducting any types of exercise or striving to achieve the recommended physical activity levels for this age group (World Health Organization (WHO), 2020). Table 2.1 below shows the classification of common physical activities and its' Metabolic Equivalents (METs). This classification is applicable to all population groups. Adapted from (Pate, Franklin, & Macera, 2007).

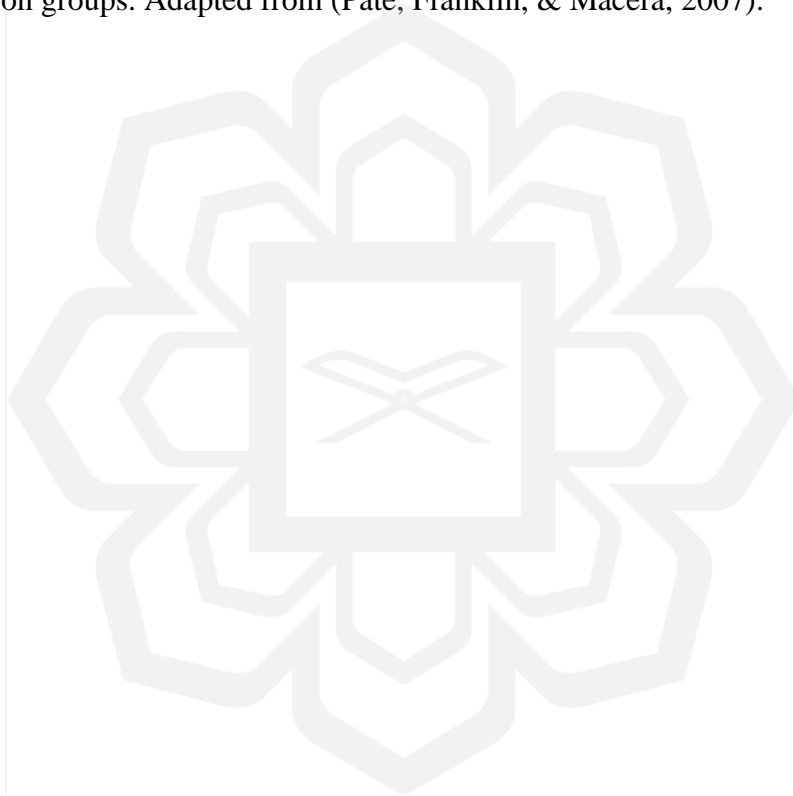


Table 2.1 MET Equivalents of Common Physical Activities Classified as Light, Moderate or Vigorous Intensity

Light <3.0 METs	Moderate 3.0 – 6.0 METs	Vigorous >6.0 METs
<b>Walking</b> Walking slowly around home, store or office = 2.0*	<b>Walking</b> Walking 3.0 mph = 3.3*  Walking at very brisk pace (4 mph) = 5.0*	<b>Walking, jogging &amp; running</b> Walking at very very brisk pace (4.5 mph) = 6.3*  Walking/hiking at moderate pace and grade with no or light pack (<10 lb) = 7.0 Hiking at steep grades and pack 10–42 lb = 7.5–9.0 Jogging at 5 mph = 8.0* Jogging at 6 mph = 10.0* Running at 7 mph = 11.5*
<b>Household &amp; occupation</b> Sitting — using computer work at desk using light hand tools = 1.5 Standing performing light work such as making bed, washing dishes, ironing, preparing food or store clerk = 2.0–2.5	Cleaning — heavy: washing windows, car, clean garage = 3.0 Sweeping floors or carpet, vacuuming, mopping = 3.0–3.5  Carpentry — general = 3.6 Carrying & stacking wood = 5.5 Mowing lawn — walk power mower = 5.5	Shoveling sand, coal, etc. = 7.0  Carrying heavy loads such as bricks = 7.5  Heavy farming such as bailing hay = 8.0 Shoveling, digging ditches = 8.5
<b>Leisure time &amp; sports</b> Arts & crafts, playing cards = 1.5 Billiards = 2.5  Boating — power = 2.5  Croquet = 2.5  Darts = 2.5 Fishing — sitting = 2.5 Playing most musical instruments = 2.0–2.5	Badminton — recreational = 4.5 Basketball — shooting around = 4.5  Bicycling — on flat: light effort (10–12 mph) = 6.0  Dancing — ballroom slow = 3.0; ballroom fast = 4.5 Fishing from river bank & walking = 4.0 Golf — walking pulling clubs = 4.3 Sailing boat, wind surfing = 3.0 Swimming leisurely = 6.0† Table tennis = 4.0 Tennis doubles = 5.0 Volleyball — noncompetitive = 3.0–4.0	Basketball game = 8.0 Bicycling — on flat: moderate effort (12–14 mph) = 8.0; fast (14–16 mph) = 10 Skiing cross country — slow (2.5 mph) = 7.0; fast (5.0–7.9 mph) = 9.0 Soccer — casual = 7.0; competitive = 10.0  Swimming — moderate/hard = 8–11† Tennis singles = 8.0 Volleyball — competitive at gym or beach = 8.0

Ainsworth, et al. 2000 (1). \* On flat, hard surface. † MET values can vary substantially from person to person during swimming as a result of different strokes and skill levels.

## **2.2 PHYSIOLOGICAL ADAPTATION OF MOTHERS DURING PREGNANCY**

### **2.2.1 Cardiovascular**

During normal pregnancy, the maternal cardiovascular system shows some anatomical and physiological changes because that time the fetus is completely dependent on the mother (Barakat et al., 2015, Perales, Nagpal, & Barakat, 2019). Maternal heart rate increased about 30.0%, blood volume increased about 40-45% and red blood cells increased about almost 20.0%. These changes occurs throughout pregnancy (Barakat et al., 2015, Perales et al., 2019).

Studies showed that, during labor, physically inactive women cannot push properly, which put greater stress on the maternal heart and may increase the risk of cardiovascular diseases later. However, regular moderate physical activity has shown to be effective for the prevention of cardiovascular risks during pregnancy (Perales et al., 2019).

As a result, cardiovascular system response to acute physical activity in pregnant women who were physically active throughout pregnancy was better than in women who remained inactive during gestation. The left ventricular chamber stiffness increased during maximum intensity physical activity. Maternal heart rate, cardiac output, stroke volume and blood pressure were increased by the aerobic physical activity, as was the ratio of the systolic/diastolic velocity in the uterine artery. This suggests an increase in ueteroplacental vascular resistance. The fetal heart rate was also increased by the physical activity, but the systolic/diastolic velocity ratio in the umbilical artery remained unaltered (Perales et al., 2019; Wald, Muennig, O, & Ewing Garber, 2014).