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Hypertension, metabolic equivalent task and Post – exercise hypotension

Authors' Contribution:

A – Study Design
B – Data Collection
C – Statistical Analysis
D – Manuscript Preparation
E – Funds Collection

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Abstracts. *People are becoming increasingly sedentary leading to a rise in clinical conditions such as hypertension or high blood pressure that has major impact on public health concern and social care. With higher blood pressure the heart has to pump harder and the arteries have to carry blood that is flowing under greater pressure in which can lead to an increases risk of a heart attack, heart failure, stroke or kidney damages and disease. Physical activity is considered to be an antihypertensive strategy to prevent or control of high blood pressure in the form of post exercise hypotension. Post exercise hypotension emphasis to lifestyle modification rather than a sole reliance on pharmacological therapy. It has been reported for every 1 MET increase in fitness level, mortality risk decreases by 11% in people with high blood pressure. Subsequently researched indicated an optimal health benefit can be achieved through moderate dose of exercise intensity at 3–6 METs for all adult aged 18-65 year that seems to be a well-designed strategy to prevent cardiovascular problem such as high blood pressure. However, there are few national programmes to serve as models for prevention and control of hypertension and few countries have embarked on national hypertension prevention and control programmes on the exact magnitude of moderate – intensity at 3–6 METs .The application of moderate intensity exercise based on metabolic equivalent may lead to a new approach to tackle hypertension.*

Keywords: Hypertension, Post –exercise hypotension, Moderate metabolic equivalent

INTRODUCTION

People are becoming increasingly sedentary leading to a rise in clinical conditions such as hypertension or high blood pressure (HBP) that has major impact on public health concern and social care [1]. In the year 2000 has been estimated [2] the world to have close to 1 billion people with hypertension and predicted an increase to 1.56 billion by 2025. High blood pressure generally is defined [3,4] with values more than ≥140 mm Hg for systolic blood pressure (SBP) and/or more than ≥90 mm Hg for diastolic blood pressure (DBP) in comparison to 115 mm Hg usual SBP and 75 mm Hg usual DBP [5,6]. With higher blood pressure the heart has to pump harder and the arteries have to carry blood that is flowing under greater pressure in which can lead to an increases risk of a heart attack, heart failure, stroke or kidney damages and disease [7,8]. Underlying conditions that cause to the high blood pressure simply are physical inactivity

and restricted usage of energy expenditures in in free-living populations in overall [9]. Paffenbarger et al. (1983) from very early years reported that Harvard male alumni who had an index of physical activity <2000 kilo calorie per week (kcal/week) was significantly more at risk of developing hypertension compared to those whose physical activity index was >2000 kcal/week [10] . In fact, physical activity is considered to be an antihypertensive strategy to prevent or control of high blood pressure that called post exercise hypotension (PEH) [11]. It results a prolonged decrease in resting blood pressure in the minutes and hours following acute exercise [12]. The observation of post-exercise hypotension in clinical condition can be traced back in 1981 year to Fitzgerald who reported a personal observation that jogging at 70% of maximum oxygen consumption (70% VO_{2max}) for 25 minutes decreased his labile high blood pressure to near normal levels that lasted for several hours, sometimes up to 10 hours. PEH thus may lead to a greater emphasis on lifestyle modification rather than a sole reliance on pharmacological therapy [13]. However, more knowledge is required about different characteristics of the exercise required to evoke post exercise hypotension, especially the intensity and duration of the bout [14]. Shephard and Balady (1999) referred to an exercise ''dose'' in terms of the total amount of energy expended (total work done) during a bout of physical activity. One can achieve that same total dose of physical activity by performing activities at a high intensity for a short duration, or at a lower intensity for a longer duration. Whether or not the health benefits are equivalent when similar doses of activity are performed at different intensities remains an area of great interest. The answer to this question has important public health and clinical implications [15]. Early physical activity guidelines in 1998 on this topic reflect the current scientific knowledge and consensus and conclude that variations in dose and intensity will yield differing beneficial effects on fitness and cardiovascular risk factors. These may interpret to different effects on cardiovascular morbidity and mortality rates [16].

APPLICATION OF METABOLIC EQUIVALENT TASK IN BLOOD PRESSURE MANAGEMENT

Estimating energy requirement according to the level of physical activity is a procedure to maintain energy balance in healthy way at each day [17]. In fact, activities is a potential determinant of energy expenditure in the form of intensity level so that physiological demand can be monitored [18]. A well-known physiologic level or intensity of physical activity is metabolic equivalent task (MET) as a useful unit for describing the energy expenditure [19]. One MET is defined as the energy cost at rest condition (i.e. sitting position) and is equivalent to a caloric consumption of 1kcal/kg/hour or amount of oxygen uptake (3.5 ml O_2/kg/min) that is vary in different individual depending on gender, age and body composition [20]. Equally, a 4 MET activity expends 4 times the energy used by the body at rest. For example if a person does a 4 MET activity for 30 minutes, he or she has done 4 x 30 = 120 MET-minutes (or 2.0 MET-hours) of physical activity [21].Veritably, using METs as an indicator of activity intensity allows generally healthy adults to accumulate credit for the various moderate or vigorous intensity activities they perform during the week [22]. To put this in practical perspective, researcher reported that people with higher level of physical fitness are less likely to develop the high blood pressure – a risk factor for several cardiovascular disease [23]. Faselis and colleagues (2014) for instance recently have reported for every 1 MET increase in fitness level, mortality risk decreases by 11% in elderly men with high blood pressure. When compared with those achieving ≤4.0 METs, mortality risk was 18% lower for the low-fit (2.0 to 4.0 METs), 36% for the

moderate-fit (6.1 to 8.0 METs) and 48% for the high-fit (METs >8.0) [24]. Fagard (2006) also earlier pointed out that exercise variables such as frequency and duration only explain 4.9 % of the variance in SBP and 1.1 % in DBP to exercise [25]. Thus, it is likely that differences in the training characteristics of based on energy expenditure would elicit the different response in lowering blood pressure (BP) following an exercise bout. Among different dose of energy expenditures based on MET as exercise intensity Haskell et al. (2007) stated that with higher dose of exercise intensity the risk of cardiovascular disease are much lesser while this high intensity may not suitable by all population to perform. Subsequently, Haskell and colleagues indicated an optimal health benefit can be achieved through moderate dose of exercise intensity at 3–6 METs for all adult aged 18-65 year that seems to be a well-designed strategy to prevent cardiovascular problem including high blood pressure. Relatively, American physical activity Guidelines in 2008 reported taking a walk is up to 3 METs, jogging and bicycling are 6 METs that simply meet the moderate intensity demand between 3 and 6 METs to improve cardiorespiratory (heart, lungs, and blood vessels) and muscular fitness. The values of 3–6 METs are equal to the 40–60% of heart rate (HR) can be comfortably sustained for a prolonged period of time≥ 30 minutes at each day that can be spread out throughout a week to gain an ideal health benefit [26,27].

CONCLUSION

There are few national programmes to serve as models for prevention and control of hypertension and few countries have embarked on national hypertension prevention and control programmes [28]. An important issue is that despite the best effort of scientific researches in challenging with high blood pressure there is no clear consensus within the literature on the exact magnitude of moderate – intensity based on energy expenditure at 3–6 METs in of high blood pressure control. Thus, it is important to characterize hypotensive responses to moderate exercise (3–6 METs) in order to understand the consequences of as new approach to tackle the hypertension.

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