American Journal of Urology Research

Research Article

How Much of Workout Does a Middle Age Man Need to Maintain his Erectile Function? A Peek at the Future -

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Submitted: 24 February 2020; **Approved:** 21 May 2020; **Published:** 22 May 2020

Cite this article: Katib AA. How Much of Workout Does a Middle Age Man Need to Maintain his Erectile Function? A Peek at the Future. Am J Urol Res. 2020;5(1): 011-014.

ABSTRACT

Purpose: To review the current literature surrounding the quality and intensity of exercise required to preserve vascular health; and to provide further insight into the role of physical activity, in particular, in maintaining erectile function.

Materials and Methods: Literature search in the main health platforms mainly PubMed, Scopus, and Ovid was carried out to study the intensity of physical activity required to maintain coronary arteries function; and to compare it to the intensity needed maintain the erectile vascular function in terms of O_2 consumption and calories expenditure. In light of the required exercise intensity and the difference in the arterial calibers in either case, a proposed corporal zone was illustrated. Middle age men were meant by this treatise; as it's the life`s stage when erectile dysfunction starts to manifest.

Results: The cardiac zone is conventionally demonstrated on the workout chart by an area with heart rate ranging from 130 to 170/min, an increase of Heart Rate (HR) 65-85% over the resting values. Based on the fact that the penile artery diameter being around one third of the coronary`s, the newly plotted corporal zone fills the heart rate area between 158-170/min with an increase of HR 78-85% over the resting values.

Conclusions: Quantified physical exercise maintains arterial function all over the body including the cardiac and penile. Future research is required to unearth the precise magnitude of exercise necessary to maintain functions of various body organs separately.

Keywords: Vascular function; Endothelial health; Erectile dysfunction; Sexual health, Workout, Corporal zone

INTRODUCTION

It is believed that physical activity is essential in the prevention of chronic diseases and the incidence of premature death. However, uncertainty remains over the optimal magnitude (frequency, duration and intensity) of exercise required to keep the body in shape and function. In other words, quantifying the intensity of exercise needed (e.g., moderate versus vigorous) is still underway [1]. There is evidence that the intensity of physical activity is inversely and linearly associated with mortality.

Researchers have revealed that regular physical activity (expending > 2000 kcal [8400kJ] per week) was associated with an average increase in life expectancy of 1 to 2 years by the age of 80 and that the benefits were linear even at lower levels of energy expenditure. Subsequent studies have shown that an average energy expenditure of about 1000 kcal (4200kJ) per week is associated with a 20%-30% reduction in all-cause mortality [2].

Currently, many health and fitness organizations and professionals advocate a minimum volume of exercise that expends 1000kcal (4200kJ) per week to keep your body fit. Moreover, they assume extra benefits on higher energy expenditures [1]. Recently, investigators have postulated that even lower levels of weekly energy expenditure may be associated with health benefits. A magnitude of exercise that is about half of what is currently recommended may be sufficient, particularly for people who are extremely deconditioned, or are frail and elderly [3]. It has been shown that moderately intense levels of exercise and of cardiovascular fitness of (> 31 mL oxygen per kilogram per minute) are effective preventive strategies against type II diabetes. Moreover, in patients with type II diabetes, walking more than 2 hours a week has also been shown to reduce the risk of premature death [4]. The cardiac zone of exercise (aerobic fitness level) is characterized by the heart rate rise between 65-85% over the resting heart rate of a given individual; that is equivalent to jogging 19km/wk at 55-70% of peak VO_2 [5]. It is also known as "hardly comfortable" zone, or zone III, which is characterized by 56-90% elevation in the Functional Threshold Power (FTP), that is the power level computed for an exerciser and marked as the reference point.

Over the past 30 years, it has become passable that the initiation and progression of a given disease and its later activation to increase the risk of morbid events, depends on profound dynamic changes in vascular biology [6]. The endothelium has emerged as the key regulator of vascular homeostasis. It is no longer viewed as a passive barrier. Conversely, it acts as an active signal transducer for the circulating molecules that modify the vessel wall phenotype [7]. Alteration in endothelial function precedes the development of morphological atherosclerotic changes and can also contribute to lesion-development and later clinical complications [6].

Nitric Oxide (NO) is involved in local regulation of endothelial function including: vascular tone, inflammation, coagulation, and oxidation [8]. If these processes were not strictly regulated, they could lead to impairment in vascular health that manifests across the entire vascular tree of the body where the penile vasculature is no exception. In case the endothelium got damaged and the NO levels become imbalanced, C-reactive protein would leak out the blood vessels causing chronic inflammation at the level of the corporal bodies that lately ends in Erectile Dysfunction (ED).

"Endothelial dysfunction" represents the probable pathophysiological link among vasculogenic ED, Coronary Artery Disease (CAD), and Peripheral Artery Disease (PAD); along with evidence-based research that raises ED as the clinical event that flags up an incident vascular illness and endothelial dysfunction. Admitting that many risk factors for atherosclerosis such as smoking, diabetes mellitus, hyperlipidemia, and obesity are prevalent in ED patients, it is likely that the aforementioned metabolic ailments create a common background for both disorders. The interplay of these factors provides a unifying physiological, endocrinological, and behavioral model for the association among ED, CAD, and PAD [9].

Results from the Massachusetts Male Aging Study have unraveled the association between ED with CAD. For instance, discovering that patients with heart diseases carry a 39% probability of having complete ED is alarming. Furthermore, studies have shown ED rates in patients with CAD to be as high as 75% [10]. Vascular endothelial dysfunction is the probable pathophysiologic link between the two disorders. The severity of ED has been associated with the extent of angiographically confirmed CAD. Further studies have revealed that the combined prevalence of minimal, moderate and complete impotence was 52%. The prevalence of complete impotence triples from 5 to 15% among subjects aging 40 and 70 years [10]. Subject`s age is, probably, the strongest variable linked to the development of ED. After adjustment for age, a higher probability of ED was directly

correlated with heart disease, hypertension, diabetes, associated medications, indexes of anger and depression, and inversely correlated with serum dehydroepiandrosterone, high density lipoprotein cholesterol and an index of dominant personality. Cigarette smoking was associated with a greater probability of complete impotence in men with heart disease and hypertension [9,10]. There is a mounting evidence of research to raise ED as the likely incident diagnosis, preceding the development of symptomatic CAD. Multiple studies have documented the occurrence of ED 2-5 years before coronary arteries` narrowing manifests [11,12]. ED severity correlated with the number of involved vessels documented by coronary angiography. Consequently, ED may be considered a possible marker for the development of atherosclerosis and CAD [13].

Physical inactivity is reflected negatively on erectile function. Meanwhile, experimental and clinical exercise interventions have been shown to improve sexual responses and overall cardiovascular health. Several studies have confirmed that physical activity provides invaluable benefits to erectile function likely via reducing metabolic disturbances (e.g., inflammatory markers, insulin resistance), decreasing visceral adipose tissue, and improvement in vascular function (e.g., supporting endothelial function) [1]. Furthermore, physical exercise can also help pump up sex drive by increasing stamina, relieving stress, and boosting self-esteem.

MATERIAL AND METHODS

The exact quantity and intensity of physical activity required for the primary prevention of Coronary Heart Disease (CHD) remain unclear [14]; and so do that of erectile function prevention. Literature search in the main health platforms mainly PubMed, Scopus, and Ovid was carried out to study the association between the quantity and intensity of physical activity with CHD risk against that of erectile health. Positively, the literature shows that erectile dysfunction due to endothelial damage, in middle-aged men can get better on exercise and increasing physical activities [15]. From the sport`s medicine perspective, increasing aerobic fitness by exercising has been advocated to be part of a healthy lifestyle. However, studies examining different effects of intensity and amount on peak volume of Oxygen Consumption (VO_2) remain scarce. In view of this, we have studied different exercise categorizations pertaining to the (cardiac zone), which serves as the vascular health surrogate. Details surrounding the entire zones are out of scope of this article (Figure 1).

RESULTS

This article has reviewed the current evidence connecting vascular function of the penile arteries to the coronary arteries in order to bring up a bundle of data surrounding erectile function. The cardiac zone is conventionally demonstrated on the workout chart by an area with heart rate ranging from 130 to 170/min, an increase of HR 65-85% over the resting values. Based on the fact that the penile artery diameter being around one third of the coronary`s, the newly plotted corporal zone fills the heart rate area between 158 to 170 / min with an increase of HR 78-85% over the resting values. Practically, there are numerous ways to present the results; probably one of which would be to display them as a distinguished zone plotted on the gym treadmill (cardio workout machine). The new design (Figure 2), brings up the target zone visible right ahead of middle age clients while exercising.

DISCUSSION

Physical idleness is a modifiable risk factor for cardiovascular

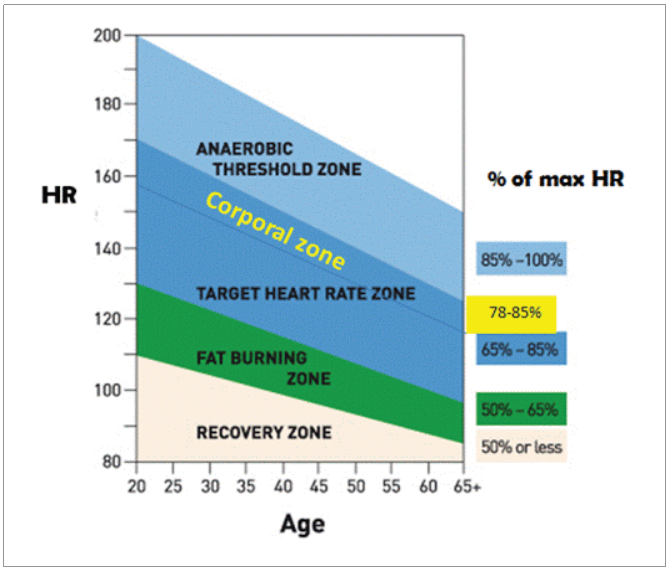

Figure 1: Details surrounding the entire zones are out of scope.

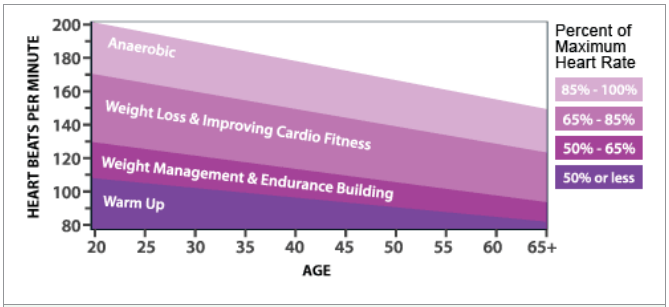

Figure 2: New design, brings up the target zone visible right ahead of middle age clients while exercising.

diseases along with a wide spectrum of chronic diseases such as diabetes mellitus, cancer (colon and breast), obesity, hypertension, bone and joint diseases (osteoporosis and osteoarthritis), and depression. In light of the artery size hypothesis proposed by Montorsi, et al. [11], a significant restriction of blood flow in atherosclerotic arteries could be subclinical in larger vessels (Figure 3). Being the penile artery`s diameter smaller than the coronaries` could explain why ED precedes CAD events and other symptomatic vascular diseases. If we assume that atherosclerosis progresses relatively at the same pace throughout major arterial beds, symptoms indicative of a disease in smaller arterial branches would manifest first; since larger vessels can better tolerate the same extent of plaque buildup. The literature supports the claims that the low prevalence of occult CAD in ED, the high prevalence of ED in patients with CAD, and the typical appearance of ED symptoms before those of CAD [11,12,16].

For ED fighters, there are several methods to conquer ED and to reclaim better sexual life that do not involve medications; probably the best of which is exercise. Anecdotally, workout is referred to as the “poly-pill”, as it helps improve various body functions. Healthy lifestyle maintenances erectile function in men [17,18]. The penile artery being affected by atherosclerosis earlier than coronary arteries in the process of age-related vascular dysfunction, coupled with the size of penile artery size being around one third of the coronary`s; a (corporal zone) was plotted high up within the cardiac zone. This treatise throws out dots for future research to connect. The plausibility

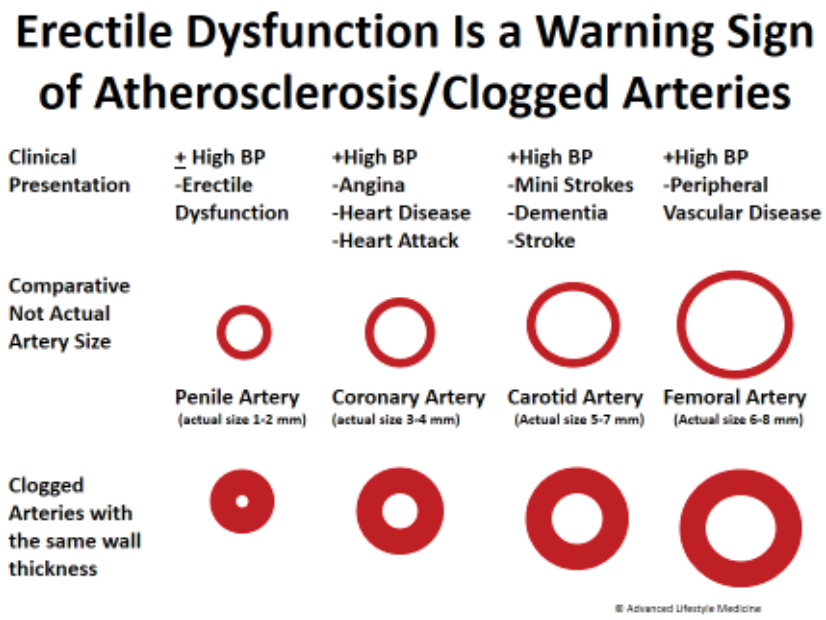

Figure 3: Atherosclerotic arteries could be subclinical in larger vessels.

to apply the same concept on different organs tantalizes gym clients to target specific body organs.

CONCLUSION

Carefully elaborate physical exercise maintains arterial function all over the body including the cardiac and penile. Moreover, graphically plotting the results on the gym treadmill chart encourages clients to hit a visible target. Future research is required to unearth the precise magnitude of exercise necessary to maintain functions of various body organs separately.

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