

Fitness, Lifestyle Changes, and Wellness: Cardiometabolic Health

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Mini Review

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Abstract

Market size of Global health club's industry is 83 billion, with over 200,000 clubs, and 160 million members worldwide. According to the Global Wellness Institute, the global wellness industry grew 10.6% from 2013 to 2015; from 3.6 trillion to 3.72 trillion market. The global corporate wellness market size was valued at USD 50 billion in 2017. According to the global wellness experts, the health and wellness industry is experiencing a "healthy" boom, - that is global anti-aging market is worth 250 billion in the US alone. As the theme of this mini review states, we would like to explore challenges and opportunities, in this growing area and take advantage of this huge fitness and wellness market trends, to develop an integrated preventive program, that will aim at a better health, as well as a healthy aging concept. Vascular diseases rank as the number one killer for decades. Development of preventive strategies, based on the modifiable risk factors for cardiovascular disease (CVD), identified by the Framingham Heart Study Group, has contributed significantly for the observed decline in heart disease related deaths worldwide. Having said that, we need to explain the discrepancy between the reported decline in CVD-related deaths, and the statement that CVD ranks the number one killer in the world. In our opinion, there is more to the mechanisms underlying vascular disease, than the modifiable risks identified by the Framingham Heart Group. In this overview, we would like to discuss the role of fitness, lifestyle changes, and wellness concept as they relate to the reduction, reversal, and prevention of metabolic diseases.

Keywords: Cardiometabolic Health; Cardiovascular Disease; Fitness

Abbreviations: CVD: Cardiovascular Disease; CDC: Centers for Disease Control; SASAT: South Asian Society on Atherosclerosis and Thrombosis; AHA: American Heart Association; JNC: Joint National Commissions; ADA: The American Diabetes Association; MD: Mediterranean Diet; IPEN: International Physical Activity and Environment Network; BP: Blood Pressure; PA: Physical Activity; PIA: Physical Inactivity; ABCS: Aspirin, Blood Pressure Control, Cholesterol Management and Smoking Cessation.

Introduction

Harvard Medical School, under the title, "Trusted advice for healthier life" states, that exercising regularly every day if possible, is the single most important thing you can do for your health. In the short term, exercise helps to control appetite, boost mood, and improve sleep. In the long term, it reduces the risk for heart disease, stroke, dementia, depression, and many cancers [1-10].

The Centers for Disease Control (CDC) and Prevention, recommends at least 150 minutes of moderate exercise like brisk walking per week, or 75 minutes rigorous exercise like running. It also recommends, strength training, that works for all muscle groups, at least twice a week. According to a health survey, by the CDC's National Center for Health Statistics, which collected information from all the 50 States, from 2010-2015, American's aren't meeting exercise goals. In Western society, sitting down for long periods of time is the norm nowadays, and according to a new study, most of us spend 75% of our day sitting or being sedentary and this behavior has been linked to increased rates of metabolic diseases such as excess weight, obesity, type-2 diabetes and vascular diseases. The authors conclude, that prolonged sitting results in moderate elevation in postprandial glucose and insulin responses, when compared to sitting interrupted with activity breaks. "Sit less and move more" is what the American Heart Association encourages all of us. They go further, "Yes, sitting too long can kill you, even if you exercise." Sitting time seems to correlate strongly with metabolic syndrome, diabetes, obesity and hypertension, increased triglycerides and reduced HDL cholesterol. What this means is that regular exercise is good for you, but what you are doing in the hours you're not exercising is also important.

Harvard researchers have found that exercise can induce the regeneration of cardiac cells and improve the heart. Similarly, studies from Brazil EpiFloripa Cohort Study demonstrated, that physical activity moderates the deleterious relationship between cardiovascular disease, or its risk factors, and quality of life. The big question that comes to mind, is how much of exercise and what kind of exercise? In the absence of clear-cut guidelines or guidance statements, individuals to large extent depend upon a self-developed protocol, which meets their comfort zone or rely on the trainers to obtain health benefits. As the founder CEO of South Asian Society on Atherosclerosis and Thrombosis (SASAT), I have been working on developing novel preventive strategies. In one of my visits to India, I was asked to give a lecture to a "Heart-Attack" support group. When I met them, they all looked like they had reached the end of their life. They were anxious, depressed and were quite concerned about doing any vigorous exercise. I am still amazed at the lack of guidelines or guidance statements about exercises in general, exercise for post heart attack, or stroke patients.

Just the other day, I was sitting in an emergency medical center at Potomac, Maryland, and glanced through their program for heart surgery patients. The newsletter mentioned about one of their open-heart

surgery patients, who has completed four sprint triathlons, a 56-mile bicycle ride and a cross-country motorcycle trip. Let us examine a typical post-operation consultation. Consult your doctor and setup a realistic fitness goals, join a gym or health club, do cardio exercise twice a week, like cycling, swimming or jogging. Two days of walking and two days of strength training. Is just exercise good enough without changes in life style? According to the American Heart Association, heart healthy lifestyle includes abstention from smoking, good nutrition, effective management of cholesterol levels, blood pressure, blood glucose, stress, and limited consumption of alcohol. American Heart Association (AHA) recently released new recommendations for how to design, measure and recognize workplace wellness programs that promote heart health. AHA's seven step help prevent CVD includes, stop smoking, get active, lose weight, eat better, manage blood pressure, control cholesterol, and reduce blood sugar.

Fitness, Lifestyle Changes and Wellness as Preventive Strategies

Among the non-pharmacological strategies for the prevention and management of patients at risk for metabolic risks such as oxidative stress, inflammation, hypertension, excess weight, obesity, metabolic syndrome, type-2 diabetes and vascular diseases, physical activity has been shown to be beneficial for improving physical health and physiological parameters. By and large, very few large population-based clinical studies, have evaluated the amounts of physical activity required or quality of exercise required, for lowering metabolic risks or for reducing CVD risks. Sattlemair and associates from the Harvard School of Public Health, have reported the results of a meta-analysis of 33 studies. According to their analysis, individuals who engaged in at least 150 min/wk., of moderate-intensity leisure time physical activity had a 14% lower CVD risk. Those engaging in 300min/wk., of moderate-intensity leisure-time physical activity, had a 20% lower risk [11,12]. There are number of reviews, on the physical activity epidemiology as it applies to children and adolescents [13-21]. Most of the studies have tried to address three common questions; What are the current levels and prevalence of physical activity and CVD in North American Youth? What is the association between physical activity and CVD risk factors in children and adolescents? What is the influence of childhood physical activity on subsequent adult cardiovascular health? Eisenmann in his overview, suggests that future studies should consider the measurement of physical activity, physical activity-genotype interactions, biobehavioral approaches to the

prevention and treatment of obesity and comorbidities, and emerging risk factors [22].

According to Minnesota researchers, in children, oxidative stress and adipokine levels, worsen throughout the continuum of obesity. Kelly and associates at Minnesota, conducted a study to assess subclinical inflammation, fasting insulin, and endothelial dysfunction, before and after moderate exercise in overweight children. They found in these children, inflammatory marker C-reactive protein was an independent component, compared with fasting insulin. Just moderate eight weeks exercise, improved fitness, HDL-cholesterol and endothelial dysfunction, in this group [23]. Currently, over 80 million Americans (30%) have hypertension and it is expected rise to 40% of the adults by 2030. Results of several meta-analysis conclude, that aerobic exercise training lowers blood pressure (BP) by 5-7 mmHg, while dynamic resistance training lowers BP by 2-3 mmHg [24]. It is believed by the experts that exercising as little as one day per week is as effective as pharmacotherapy for reducing all-cause mortality among those with hypertension. A meta-analysis of a major exercise and drug trial showed that no statistically detectable difference exist between exercise and drug interventions [25]. Joint National Commissions (JNC) of the American Heart Association, American College of Cardiology, American College of Sports Medicine, European Society of Hypertension, European Society of Cardiology and Canadian Hypertension Education Program, all recommend exercise for the prevention, treatment and control of hypertension [22].

The prevalence of excess weight and obesity have increased dramatically in the last three decades. Currently, there are over 1 billion (30% of the adult population) obese individuals worldwide. All indications are, that this trend will likely to continue unabated in the coming years [26]. The recommended strategies to reduce obesity, have focused on healthier diet and physical activity.

Considering the ever-increasing rate of increase of this metabolic disease, clearly these approaches have not been successful. It is not clear as to whether the failure to restrict energy or to maintain high levels of energy expenditure is the real cause. Nonpharmacological approaches to the management of excess weight and obesity is a subject of great controversy. It seems that a threshold for achieving energy balance occurs at an activity level corresponding to 7000 steps day.

In the Finnish Twin Cohort study, twins who have been studied for over thirty years, demonstrated that active co-twins had significantly lower body weight, BMI, and fat percent and they also had much less, visceral and hepatic fat, compared with their inactive co-twin [27]. Physical activity (PA) seems to regulate food intake, therefore increasing physical activity holds potential, as part of the solution of the ongoing obesity epidemic [26]. Management of excess weight and obesity is quite a complex subject and readers are urged to refer to original articles and reviews for additional information [28-35].

Excess weight and obesity contribute significantly, to the development of prediabetes as well as diabetes. Physical inactivity (PIA) is the fourth risk factor for global mortality and contributes significantly, to the development to prediabetes and diabetes [36]. In a recent study from Mexico, the researchers used three specific types of activity in the past seven days, walking, moderate activity, and vigorous activity to calculate aPA-index. Jadhav and associates reviewed the effect of PA on oral glucose tolerance, fasting blood sugar, and HBA1c in prediabetic subjects. They concluded that PA promotion and participation, can help slow down the progression of disease in individuals with prediabetes [37]. Boniol and associates, did a systematic review and a meta-analysis of randomized clinical trials, on the effect of physical activity on HBA1c levels [38]. The analysis demonstrated, that moderate increases in physical activity are associated with significant reduction in both fasting glucose and HBA1c. American Diabetes Association defines (2017) complete physical activity, as a routine that includes, continuous activity (walking, climbing stairs), aerobic exercise (brisk walking, swimming, dancing), strength training (weights), flexibility exercises (stretching, yoga). When it comes to what is the best physical activity, the recommendations keep changing by the minute. The American Diabetes Association (ADA) recently (2018) released a “**position statement**” with new evidence-based recommendation on physical activity and exercise for people with diabetes [38]. A big point is the 3-for 30 recommendation: do three minutes of light physical activity-such as leg extensions or walking- for every half hour spent simply sitting still. Contrary to this recommendation of the ADA, a study reported from the Netherlands, concluded that when matched for total duration, moderate-intensity endurance-type exercise, represents a more effective strategy to improve daily glucose homeostasis, than repeated bouts of activities of daily living [39,40]. In a short review like this, it is not possible to cover all aspect of fitness, physical activity and lifestyle changes. Adoption of a healthy lifestyle, and maintenance of physical activity, are critical for blood

glucose management and overall health of individuals, with diabetes and prediabetes conditions [41, 42].

Discussion

Philip Greenland and Valentin Fuster in a recent Editorial in *JAMA*, report and comment on the results of a study done by Stamler and associates, in which five cohorts of young adult, middle-aged men, as well as middle-aged women from Chicago Heart Detection Project in industry, and screenees from the Multiple Risk Factor Intervention Trial, were followed for the effect of “Healthy factors.” Healthy factors were defined, as normal levels of major CVD risk factors (serum cholesterol, blood pressure, no diabetes, no smoking). Over 16-22 years of follow-up, they observed 70% to 85% lower cardiovascular mortality, 40% to 60% lower total mortality and 6 to 9 years greater predicted life expectancy [43,44]. What does “healthy living” mean? According to the US Preventive Services Task Force (USPSTF), a heart-healthy diet is rich in vegetable, fruits, fiber and whole grains, and low in salt, red and processed meat, and saturated fats. As for exercise, guidelines recommend at least 2.5 hours of moderate exercise, or 75 minutes of intense exercise every week. In a commentary in *JAMA*, Salim Yusuf and associates write, “Regular physical activity is one of the simplest ways, for individuals and populations to reduce the risk of premature death and incident cardiovascular disease [45,46].

Dr James Wright and associates of the Division of Heart Disease Prevention and Stroke Prevention of Centers for Disease Control (CDC) and Prevention, USA, say, “Small steps are needed for cardiovascular Disease Prevention in an opinion article in *JAMA* [47]. Experts agree that despite seven decades of improvement, since the time Framingham Heart Study was initiated, recent evidence suggests, that rates of myocardial infarction, stroke, and other cardiovascular events, have plateaued and are increasing in some countries. According to this report, “Million Hearts”, a national initiative co-led by the CDC and Centers for Medicare & Medicaid services, USA, was launched in 2012 with a five-year aim, to prevent 1 million acute cardiovascular events by improving key CVD risk factors [47,48]. Based on the projections using 2012-2014 data an estimated 500,000 events may have been prevented by 2016 [48]. Even in the most advanced nation, the success was less than or close to 50%. To improve upon these findings, Million Hearts 2022 began in 2017, with new and fresh partnerships. The first report, describes the national and state-level burden of CVD events most likely to be prevented by low sodium

consumption, increase physical activity and improving ABCS (aspirin, blood pressure control, cholesterol management, and smoking cessation). The second report reveals, the frustratingly slow rate of improving population-level measures of cardiovascular health.

Even in a highly advanced country like the USA, compliance is a major problem. It is estimated that over 9 million are not taking aspirin as recommended. Forty million have uncontrolled hypertension, Another, forty million are eligible for aspirin prophylaxis, but not enrolled. Fifty-five million, use tobacco or tobacco products. Seventy million are physically inactive. Together, these represent more than 213 million potential opportunities for prevention of CVD events (*JAMA*). In countries like China and India, with large populations, millions of individuals with metabolic risks, excess weight, obesity and prediabetes are not under any preventive management protocols. Assessing, interpreting, and managing the impact of various metabolic risks, such as hypertension, oxidative stress, chronic inflammation, excess weight, obesity, subclinical atherosclerosis, and endothelial dysfunction, pose a great challenge at the population level. The economists tell us that in the next two decades, they will cost the world 30 trillion dollars. Economists were the first to use the word “tsunami” to describe these public health epidemics.

Recognizing the social, economic, and public impact of metabolic diseases, the WHO Global NCD Action Plan 2013-2020 and nine voluntary global NCD targets were adopted by the World Health Assembly in 2013. This document provides information about the voluntary global target to halt the rise in diabetes by 2025. Reaching this target is an important step, toward realizing the commitments made at the UN General Assembly High Level Meetings on NCDs in 2011 and 2014, and the vision for the Sustainable Development Goals. In spite of the fact, that all participating countries agreed to implement the Millennium Development Goals, in the absence of a country level prevention strategies and action plans, it is left to personal behavior as fundamental and the only choice for primary and secondary prevention. The action plans at the Global level spelled out the role of private sector, and industry sector, as supporters of national efforts to control these diseases. Development of human resources, infrastructure, and various efforts to improve access to, and affordability of medicines and technologies, go a long way in the reduction, or prevention of these metabolic diseases. Excess weight, Obesity and Diabetes serve as test cases worldwide for the success or failure of national programs.

In our original manuscript we did not discuss two popular areas of interest, the beneficial effects on Mediterranean diet and the ancient Indian system of exercise and physical activity, Yoga. In view of the fact the reviewer suggested that we include these topics, we will discuss the impact of these lifestyle modifications in our revised discussion. Researchers from Italy and Canada have reviewed the evidence of the relationship of Mediterranean diet (MD) on incidence/mortality for cardiovascular disease, coronary/ischemic heart disease, acute myocardial infarction and stroke by sex, geographic region, study design, and type of MD score [49]. A recent multicenter case-control study from Italy found a strong correlation between poor adherence to the MD and promotion in the following risk factors: hypertension, hypercholesterolemia, BMI and diabetes [50]. The PREDIMED Study Investigators reported that among persons at high CVD risk, a Mediterranean diet supplemented with extra-virgin olive oil or nuts reduced the incidence of major cardiovascular events [51]. INTERHEART study done in 52 countries reported abnormal lipids, smoking, hypertension, diabetes, abdominal obesity, psychosocial factors, consumption of fruits, vegetables, regular physical activity account for most of the risk of myocardial infarction worldwide in both sexes and at all ages in all regions. The researchers suggested that approaches to prevention can be based on similar principles [52]. Khera and associates from Center for Human Genetic Research, Massachusetts General Hospital, Boston, reported that among participants with high-genetic risk, favorable lifestyle was associated with a nearly 50% lower relative risk for coronary artery disease than was with unfavorable lifestyle [53,54].

There is considerable interest in the beneficial effects of Yoga, a popular mind-body practice in modifying risk factors for cardiovascular disease and metabolic syndrome [55]. However, American Heart Association on their web site say, "that yoga does not count towards the 150 minutes of moderate intensity aerobic activity per week." Traditional yoga is done by slowly stretching the body into a variety of poses while focusing on breathing and meditation. We and others have discussed holistic approaches to health and one aspect of that approach as yoga, as it is designed to bring about increased physical, mental and emotional well-being [56]. Mala Cunningham, counseling psychologist and founder of Cardiac Yoga writes, "Hand in hand with leading a heart healthy lifestyle, it really is possible for yoga-based model to help prevent or reverse heart disease." It may not completely reverse the disease but will definitely offer some benefits. Just to end this discussion with a positive note, let me conclude with a review by Cramer and associates. The

meta- analysis by Cramer and associates revealed evidence for clinically important effects of yoga on most biological cardiovascular disease risk factors. Despite methodological drawbacks of the included studies, authors suggest that yoga can be considered as an ancillary intervention for the general population and for patients with increased risk of cardiovascular disease [57].

Global Health Organizations are in an excellent position, to implement population-based as well patient centered, approaches to reduce behavioral risk factors associated with chronic metabolic diseases [58]. Considering the severity of the rise in the incidence of metabolic disease epidemic worldwide, the preventive strategies should be global, collective and decisive. Since the theme of this article is Fitness, Lifestyle and Wellness, I would like to briefly discuss what is happening in India, in one of the leading diabetes clinic. Madras Diabetes Research foundation, headed by Dr. V. Mohan, has established a physical activity department at the clinic. The department is dedicated to promoting physical activity and help individuals to enhance their health, fitness, and quality of life. The Physical Activity Research Department is currently studying the association of Built Environment [human made surroundings which include homes, schools, parks, pedestrian pathways, roads, and accessibility to facilities such as shops and hospitals as well as infrastructure such as water supply and electricity] and Physical Activity in relation to Metabolic health among adolescents aged 12-17 years through the BE ACTIV INDIA! Study. This study is the first of its kind in India and is part of the IPEN (International Physical Activity and Environment Network), an ongoing 19-country study on the effects of the BE on PA in adults and adolescents [59]. We would like to see such dedicated efforts at every clinic worldwide. We also would like to see that the clinicians, endocrinologists, cardiologists, who treat metabolic diseases make sure, that their patients get counseling on the importance of healthy diet, physical activity, and lifestyle on the outcome, irrespective of the medical treatments. Finally, as AHA recommends, "Any activity is better than no activity [60]."

Conclusion

Market for Global Health Fitness industry is huge, running to several billion dollars in the US alone. According to the Global wellness Institute, the global wellness industry grew to 3.75 trillion dollars worldwide. Experts are of the opinion, that physical activity, healthy lifestyle, and well ness are the key to a healthy disease-free life. As mentioned earlier, Harvard Medical School in

their report on “Trusted advice for healthier life” state that exercising regularly, every day if possible, is the single most important thing one can do to improve their health. The centers for Disease Control and Prevention, USA, recommends at least 150 minutes of moderate exercise like walking or 75 minutes of rigorous exercise like running per week. American Heart Association recently released a new recommendation to address gaps in common standards around comprehensive workplace programs. In the absence of a clear-cut guidelines, it is better to follow the guidelines or guidance statements issued by professional societies as they represent, the collective wisdom of the experts. Several clinical trials beginning with the MONICA, Seven Country Studies, INTERHEART and Harvard Studies, have demonstrated the benefits of the management of modifiable risk factors for CVDs. We strongly believe, that at the personal level as well as population level, the prevention strategies should start as early as possible, and not wait till the various risk factors develop. In view of this viewpoint, we believe that healthy diet and moderate physical activity should become a part of the life or put it other way a way of life. Experts agree and recommend lifestyle modification, as the most effective behavioral therapy, for effective management of metabolic diseases. Having said that, we would like to inform the readers, that this is the most difficult strategy to implement at the population level. Metabolic risks such as hypertension, oxidative stress, chronic inflammation, altered flow dynamics of the blood, endothelial dysfunction, subclinical atherosclerosis, excess weight, obesity and diabetes are on the rise worldwide, and have reached epidemic proportions. Therefore, the only choice we have at present for halting, reducing, or preventing these risks is to address them head-on, develop robust preventive strategies including, strong recommendation for fitness, wellness, and lifestyle programs at individual as well as population levels. In this mini review, we have discussed in brief, the physical activity as it relates to hypertension, oxidative stress, inflammation, excess weight, obesity, prediabetes, diabetes, and vascular diseases. Lifestyle modifications are necessary, to maintain ideal metabolic activity and prevent the development of metabolic risks, and such modifications should include, both nutritional treatment and physical activity. Various stakeholders should explore challenges and opportunities in the growing areas of this huge fitness and wellness market trends, and develop an integrated preventive program, that will aim at a better health, as well as a healthy aging concept.

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