

Systematic Interventions for Human Health

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Abstract

Physical activity improves general health status of humans, and prevents many disorders and illnesses including cardiovascular diseases, cancers, ageing etc. Physical activity regulates processes of homeostasis, cell differentiation, proliferation and apoptosis. Exercise induces extracellular and intracellular changes, that influence the genes controlling inflammation, angiogenesis and mitochondrial synthesis. Moderate bicycling, standing or light walking, enhance endothelial cells' health, increasing the flow of blood through blood vessels. Changes in the brain start at age 50, affect memory and other cognitive functions. By age 70, one in six people has mild cognitive impairment which can progress to Alzheimer's disease. Physical activity improves quantity and quality of mitochondria, activates a variety of cellular pathways, increases expression of proteins that protect muscle from inactivity and attenuate muscle atrophy. Acute intense exercise training increases the content of several proteins, which play a role in cytoprotection. Physical inactivity contributes to cardiovascular diseases, cancers, diabetes, musculoskeletal diseases or neurologic disorders. Exercise training in the long run, reduces fat stores in our body, changes sex-hormone levels, reduces free radicals and has a direct effect on tumors. Many studies point out the higher activity of enzymes involved in fat metabolism. Habitual training can prevent age-related increases of plasma lipids and decrease glycogen storage. Physical activity plays a crucial, positive role in oxidative stress, systemic inflammation and immune responses. Many types of exercises increase cardiovascular fitness, help to deliver nutrients and oxygen-rich blood to the brain, increasing brain volume and create additional blood vessels in the brain and in other organs.

Physical activity prevents hearing and vision loss, leads to fewer colds, improves sleep, lowers rates of urinary incontinence, and lessens constipation.

Being active means less sitting time during the day. After exercise and rest, we need to stand-up, walk for few minutes or do something like domestic chores for a short period of time.

Keywords: Non-Communicable Diseases (NCD); Physical Activity (PA)

Introduction

The World Health Organization (WHO) has introduced the recommended levels of physical activity (PA), and strategies for high, middle and low income countries. The programmes emphasize the benefits of being active, participating in sporting events or playing games. WHO guidelines include student, occupational, recreational, family and community activity. The WHO underlines the improvement

of health, particularly in the long term. In the most Western countries, obesity, cardiovascular diseases (CVD), type 2 diabetes mellitus, cancers, chronic respiratory diseases, are still a huge problem and a burden on the economy. They require more attention, additional strategies to reduce incidence and prevalence of non-communicable diseases (NCD) [1,2]. Obesity, cardiovascular diseases and type 2 diabetes mellitus are mentioned by the WHO as the most severe in the Western world [2]. Meta-analysis were performed on outcomes for cardiovascular disease, diabetes, cancer, and all-cause mortality. Prospective cohort designs were used. Significant hazard ratio associations were found with all-cause mortality, cardiovascular disease mortality and incidence, cancer mortality and incidence, as well as with type 2 diabetes. Prolonged sedentary time was independently associated with deleterious health outcomes regardless of physical activity [3]. Mostly sitting time, watching TV or other screens (computers, phones) is associated with the increase of all-cause mortality, regardless of physical activity. Without more effective intervention, as better implementation of physical activity and proper healthy nutrition, it will be a problem to curtail non-communicable diseases. Physical activity in modern diets has become the staple of them and requires a new approach and should be better understood in the public domain. Any kind of activities are better than nothing [4]. Ten minutes of walking is an effective way to decrease blood pressure and can start a broader exercise plan. In 2013, the worldwide cost of physical inactivity was more than 50 billions dollars and without doubt, is rising [4]. Only direct and indirect cost of hypertension in 2011 was over 46 billions dollars [5]. Economy matters. Not too many countries are able to spend more and more millions of dollars each year on health care. Nonpharmacological interventions are at low cost when facilitating walking, cycling, swimming, leisure or recreational activity. Encouraging and motivating people to become active is possible in the prevention of CVD, cancer, and others malignancies [4,5]. Starting slowly, stopping when one feels pain, taking a break, but constantly trying to prolong the duration of exercise can bring satisfaction and positivity [6].

Practical implementation of physical activity programmes in schools should involve students, teachers and parents and spread to the entire community. These programmes can integrate children as well as seniors in physical activity. Cementing healthy lifestyle from primary school students with older age groups of people can boost participation and engagement in different kinds of exercises [7,8]. Because we are living longer and a larger percentage of the people is over 65 years old and not actively working, improving good health in advanced age is necessary. Too many people are feeling abandoned, lonely, mostly staying home, moving sometimes only near their vicinity. Here, we need a public health strategy that would sufficiently improve participation in sports. The more we are ageing, the less physically active we are becoming [8]. A friendly environment, like free of charge entry to sports facilities for the elderly or for people living in poverty, additional programmes among people of low socio-economic status may improve overall health by reducing smoking, excess alcohol use, changing bad nutrition habit and increasing different type of sport events. It can contribute to the reduction of cardiovascular, cancer major risk factors [9].

Physical inactivity mostly contributes to cardiovascular diseases, cancers, diabetes, musculoskeletal diseases or neurologic disorders. This negative impact encompasses our physiological, psychological, and societal aspects [10]. As we are becoming more overweight and obese, physical activity is the last choice to avoid it. Being engaged in sports, walking or running, swimming, cycling, we are able to reduce food intake or more importantly, avoid junk food and stick to healthy choices [11]. Performing regular physical activity for longer duration allows the maintenance of weight, reduces body fat and helps avoid infection [12,13].

Children, youth, college students and physical activity

Despite the general myth that our kids are running around during the day, we have to acknowledge discrepancies and caveats between schools in physical activity. Many of them are insufficiently active and have sedentary behaviour [14]. Sometimes as much or more than 60 per cent have low physical activity levels [15,16]. National, local strategies, policies and health programmes can increase overall exercise habits. School hours provide the best environment for sport. Children are educated on this field, they have recess, during and afterschool activities, and teacher support [17,18]. Our goal is to make physical activity a norm. It is necessary to promote sports and exercise programmes. For better implementation we need low physical activity like walking, climbing stairs to high intense aerobic exercise [19].

Cardiovascular diseases and cancer prevention

The health benefits of PA for the prevention of cancers has been accumulating for years and whether exercise is beneficial has largely been answered [20]. Exercise is very important as a primary and secondary form of prevention. Promoting health management includes education and training. Children aged 5 - 17 years old should exercise (moderate, vigorous) 60 minutes a day. Adults aged 18 - 64 at least 150 minutes a week. For better health outcomes, activity should be performed in this age, up to 300 minutes per week, with bouts of vigorous exercise. The same levels of physical activity should be implemented for adults 65 years old and above [1,21]. Most diseases are caused by civilisation, unhealthy food, smoking habits, excessive alcohol intake, with physical inactivity as the fourth leading risk factor for global mortality. Demographic changes, together with an increase in the percentage of ageing people, is another risk factor of NCD [2]. Preventive role in cardiovascular diseases, some cancer types, plays physical fitness during waking day with obligatory bouts of intense exercise [3,4,22]. Prolonged hours of sitting are harmful despite exercise performance during the day. After achieving activity target, people can become sedentary for the rest of the day. Some of us who do not tend to be physically active, can participate in other leisure activities like domestic chores, playing games but not being sedentary in their waking hours. Physical inactivity and global pandemic obesity independently are responsible for greater risk of hypertension severity and several forms of cancer [4,5,23]. We have better challenges in reducing individual patient body mass index (BMI) than in large population. Exercise training is effective in lowering blood pressure, the number one culprit of premature death. The barriers to healthy living weigh heavily on people's minds: discomfort, boring, lack of time, tired, weather. When we track the frequency of physical activity, engage primary physicians, nutritionists, educators and therapists we are able to reduce CVD and cancer risk factors. Physical activity is associated with lower risk of more than ten types of cancer, including colorectal, endometrial and breast cancer. High levels of PA can reduce oesophageal adenocarcinoma but increase melanoma incidence. Performing long lasting exercises can reduce cancers of digestive system, particularly colorectal cancer in men. Exercise diminishes cancer risk of lung, prostate, ovary and pancreas. Lower risk were seen for liver, kidney and myeloma [5,24,25]. Sedentary lifestyle is associated with more than 50 per cent risk of colorectal cancer and over 60 per cent for endometrial [24]. Not only is moderate-vigorous training important in cancer prevention, but low, leisure time activity improves patients' survival as secondary prevention [25].

Cardiovascular fitness is most important as long as mortality and morbidity is the highest globally among all illnesses. Moderate exercise with a bout of 10 minutes of vigorous intensity or high intensity training is the main factor in the prevention of CVD like hypertension, coronary heart disease, heart attack or stroke [2,5,6].

10 million new cases of dementia worldwide occur every year. Already, 50 million people suffer from debilitating processes of dementia, where the most common type is Alzheimer's disease, irreversible and progressive brain disease. Highest fitness decreases most dementia risk about 88 per cent. Stopping smoking, eating a healthy diet, getting enough sleep, staying socially engaged, reading or playing games, are most preventive cardiovascular exercises which have positive benefits on brain health [26]. After a first-ever stroke, physical activity plays positive role as secondary prevention [27]. But hypertension is the main culprit for heart disease and stroke. Secondary hypertension is most preventable by physical exercise [28]. Because the average adult in developed countries spends half of the waking day sedentary, glucose can not be sufficiently burned and lipids metabolism can not be fully compensated. People should be advised more often to stand up or walk to achieved beneficial cardiovascular effects. If we vigorously exercise and later becoming sedentary for hours, it will be difficult to maintain good health. Just standing up alone, makes muscular contractions able to release chemicals to reduce bad cholesterol, burn blood sugar, keep insulin level steady [29].

Discussion

Physical activity, healthy diet, is a key to prevent most of CVD and cancer. Non-pharmacological intervention is safe, profitable, with minimum side effects. At any time during lifespan, we can alter from bad habits to healthy living. It is not easy suddenly to quit smoking, reduce calories intake or becoming physically active, until something happen to us, like disease, poor quality of life. Than we try to reverse from illness to good health [1,5,7].

Primary prevention is the most important recommendation for long term health benefits. From education to implementation of a healthy lifestyle: walking, running, swimming, cycling, to more endurance-based exercise like lifting, high-intensity interval training, vigorous-intensity continuous exercise and other physical activity [1,3,10].

Vegans and vegetarians have the longest lifespan. For people who can not switch to this habit, the DASH diet (Dietary Approaches to Stop Hypertension) is the best choice, followed by the Mediterranean Diet with more added olive oil. It is not easily achievable goal for Western society or for people in other developed countries because old habits die hard [4,23,24]. Working together to implement moderate-to-intense exercise training in our societies should be the most important goal. Activating programmes on all levels, involving healthcare workers, parents, teachers, students, in different environments like schools, homes, out and in-facilities increases life span and quality of life [1,14-19].

Conclusions

Our paper summarizes current evidence on physical activity. We see different levels of physical activity around the world, some progress as well as pitfalls. The best intervention is for entire communities to implement healthy lifestyle programmes. It can be promotion, education, counseling in clinical practise. It should be obligatory for primary health care workers because it does not prolong the patient's visit. We see possibility for collaboration between public health services and facilities like parks, recreational fields, school gymnasiums.

Evidence-based research points out that the immediate incorporation of physical activity in the population slows down incidence of cardiovascular diseases, chronic respiratory diseases, cancers, diabetes or obesity.

The literature search suggests strong evidence in prevention of non-communicable diseases. Primary and secondary prevention have the potential to be very effective on human health. The benefit of recreational, occupational, moderate or intense exercise is the reduction of all-cause mortality. The greater positive impact is obtained by the most active people, just 60 minutes to 90 minutes a day.

We need additional research to prove the effectiveness of physical activity, but we know already, that exercise reduces the risk of diseases and plays a role in secondary prevention.

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