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# Exercise prescription for prevention and control of chronic diseases by healthcare providers in Kenya

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Exercise is healthy, and it plays a practical and safe means to decrease the burden of non-communicable diseases. Physical activity (PA) and exercise are key interventions for use in primary and secondary prevention of chronic diseases and especially when physical activity and exercise are part of a medical management plan. There is a need for PA promotion interventions in primary care and evidence that providers want to provide PA information to their patients. Several quasi-experimental and randomized trials have been conducted evaluating the efficacy and effectiveness of primary care PA promotion interventions. While not all primary care PA promotion interventions were successful from the review, the majority of studies support this approach to increasing PA. The health care system should play a role in supporting patients and the population at large to increase their PA to sufficient level for prevention and control of these chronic diseases. Even though being physically active for health and well-being is accepted by much of the general population, the majority of people in developed countries fail to meet even minimal requirements. Considering the numerous preventative and therapeutic health benefits associated with a physically active lifestyle, the effectiveness of exercise to treat various chronic diseases, the limited side effects associated with exercise in comparison to pharmaceutical therapies and the role health providers can play in the promotion of physically active lifestyles, health providers should take an active role in exercise prescription for the patient's sake. The Exercise is Medicine Initiative is being used in other parts of the world however, it has not fully taken off in many developing countries.

**Key words:** Physical activity, exercise is medicine, chronic disease, exercise prescription, primary prevention, secondary prevention, health promotion

## INTRODUCTION

Noncommunicable diseases (NCDs), also known as chronic diseases, are diseases of long duration and generally slow progression. The four main types of noncommunicable diseases are cardiovascular diseases (like heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and diabetes (WHO, 2014).

According to research, exercise in general improves quality of life and health, specifically prevention and control of non-communicable diseases (Pedersen and Saltin, 2006). There is evidence that exercise can help people manage diabetes (Colberg and Sigal, 2010), lower blood pressure and reduce the risk of coronary heart disease, hypertension and stroke (Green et al., 2011), reduce risk of developing breast and colon cancer

(Franzoni et al., 2005) and has beneficial effects on body weight, fat mass and central obesity (Slentz, 2004). Exercise has a broad range of benefits cutting across exercise for rehabilitation, exercise for health, exercise for physical fitness and exercise for performance enhancement, however, this paper will be focusing on the role of exercise in prevention and control of chronic diseases. In spite of the public's knowledge that physical activity leads to a range of health benefits, physical inactivity is the fourth leading cause of death worldwide after blood pressure, smoking and high blood glucose (Khan et al., 2011). It is estimated that, in 2010, 6.4% of adults had diabetes mellitus affecting 285 million in the world and the prevalence is expected to increase to 7.7% by 2030, affecting 439 million adults (Shaw et al., 2010). A 67% increase in the prevalence of diabetes in developing countries is expected from 2010 to 2030 (Shaw et al., 2010; Vaillant, 2001). In Kenya non-communicable diseases are a major public health concern with significant social and economic implications in terms of health care-needs, lost productivity and premature death in the country. (KSSFNCD, 2015). Research shows that non-communicable diseases have been a growing problem in Kenya over the years (Oak Foundation, 2016; World Health Organization WHO, 2015; Machio, 2012; Kirigia et al., 2009; Christensen et al., 2008; Waudu et al., 2006).

According to recent data in Kenya a developing country, many sick people (77%) utilize health care (Wamai, 2009). This indicates that a large number of Kenyans get the opportunity to meet a health care provider. As noted by Tulloch (2006) healthcare providers have access to a large proportion of the sedentary population who respect their advice and are more likely to change their behaviors when advised (Grandez et al., 2009). Almost two-thirds of patients (65%) would be more interested in exercise and PA to stay healthy if advised by their healthcare provider while 24% of patients will turn to fitness and health web sites for advice on exercise and PA after consulting their doctor first (25%) (Derman et al., 2008). Evidently healthcare providers have an opportunity to question and counsel patients about the importance of physical activity (Glasgow et al., 2001; Green et al., 2002; Simons-Morton et al., 2000) as most people cite their general practitioners as their primary source of information regarding healthy lifestyle decisions (Lanhers et al., 2015). Healthcare providers are therefore well positioned to champion the cause of prevention of chronic diseases by prescribing physical activity during standard consultation (Matheson et al., 2011).

## METHODOLOGY

The following methods were used to collect data.

**Library research** This was conducted in the following centers and libraries in Masinde Muliro university;

- Ministry of health.
- Kenya national library
- Internet
- Hospitals and clinics.

**Desk review** was done using the following descriptors (Physical activity; exercise is medicine; Chronic disease; Primary prevention; Secondary prevention; health promotion; exercise prescription). The search was done in Pubmed, Crossref, Genamics Journal Seek, Global impact factor.com, Google Scholar, Academic keys, Open Academic Journals Index, Sherpa/RoMEO (University of Nottingham), Chemical Abstracts (CAS) and Open-j-Gate.

## RESULTS

### Benefits of exercise in prevention and control of diabetes

Exercise is an insulin-independent stimulus for increased glucose uptake by the working muscle cells via the Glucose Transporter Type 4 transporter, both aerobic training and resistance training improve insulin action (Colberg and Sigal, 2010). In the article Colberg (2010) said exercise prescription program for persons with diabetes should be individualized according to medication schedule, presence and severity of complications, and goals and expected benefits of the program.

It is recommended that, due to the high prevalence and incidence of comorbid conditions e.g. autonomic neuropathy and peripheral neuropathy in diabetic patients, pre-exercise testing should precede training programs and additional precautions to avoid hypoglycemia include blood glucose monitoring, adjustment of the insulin dose and dietary modification should also be a priority (Pedersen and Saltin, 2006; Boulton et al., 2005).

According to Hordern (2012) diabetic patients should accumulate to a minimum of 210 min per week of moderate-intensity exercise or 125 min per week of vigorous intensity exercise with no more than two consecutive days without training with two or more resistance training sessions per week (Hordern et al., 2012). Therefore, exercise prescription for a diabetic person should preferably be written and managed by individuals with appropriate qualifications and experience.

### Benefits of exercise in prevention and control of Hypertension

In a study by Mc Donald, it was demonstrated that during exercise, systolic BP may rise from baseline, but following 30 to 45 minutes of moderate exercise, a 10 to 20 mmHg decrease in systolic BP are noted which may last for up to ten hours (MacDonald, 2002).

Although research has demonstrated up-regulation of endothelium-mediated vasodilator function together

with an increase in arterial compliance (Green et al., 2011), other researchers have shown that the prolonged effect of exercise on the lowering of systolic BP can be attributed to a decrease in stroke volume rather than peripheral vasodilatation (Fletcher et al., 2013).

### **Benefits of exercise in weight management**

Research has proven that a high-volume-high-intensity exercise program had the greater beneficial effects on body weight, fat mass and central obesity than a low amount of exercise (Slentz, 2004). It has been shown that exercise in combination with a nutritional plan is the most effective approach for sustainable weight loss (Macfarlane and Thomas, 2010) due to the combined effect to create a positive caloric imbalance needed for weight loss.

### **Benefits of exercise in prevention and management of cancer**

Physical activity has been seen to have good effect on a person's antioxidant capacity (Franzoni et al., 2005) and consequent ability to scavenge free radicals which have a carcinogenic affect (Dreher and Junod, 1996), moreover physical activity increases bowel transit time and thus decreasing the duration of contact between fecal carcinogens and colonic mucosa to prevent colon cancer. (Shann, 2000). Physical activity also curbs the cancerous effects of certain hormones like testosterone which is a risk factor for developing prostate cancer and even after cancer has been diagnosed, the survival rate of breast and colon cancer increase by 50–60% when engaging in regular physical activity (Shann, 2000).

### **Effectiveness of Primary Care Interventions**

A non-randomized study by Logsdon et al., (1989) compared usual care to age specific intervention protocols based upon multiple individualized behavioral risks (lack of exercise, high blood pressure, excessive dietary fat, overweight, seat belt use, and alcohol misuse) as determined through survey responses. Potential participants were patients who had seen their PCP (primary care providers) in the past two years and responded to a mailed survey. After questionnaire completion, patients made appointments to see their PCP for a free preventive care visit. Follow-up surveys were collected 10-12 months later. Intervention participants who attended the free PCP appointment (n=140) were more likely to begin exercising regularly at 12-months follow-up compared to participants at the control sites (n=83) (p=0.02; OR 1.65; 95% CI 1.12-2.43). There was a potential for bias in this study's results due to self-selection of those attending the appointment or not. Those in this group may have had increased motivation for change.

Medical doctors in South Africa for example (Roos, 2014) show that only 24.1% of doctors prescribe

exercise as routine. Other researches done on the same issue (Buchholz and Purath, 2007; Roos, 2014; Abramson et al., 2008) show time and knowledge being the major barriers to exercise prescription. In a review done by Seth (2014) in the United Kingdom(UK) showed that barriers to exercise prescription in the UK included scarcity of referral pathways, lack of time, not having adequate access to reference material to guide them in the practical aspects of exercise prescription and a lack of confidence in the services they are referred to. It should be considered that relative contraindications e.g. chances of developing arthritis in certain age groups can be superseded if the benefits of exercise outweigh the risks associated with exercise. A major concern when prescribing exercise is the increased risk of sudden cardiac deaths and myocardial infarction associated with vigorous physical exertion (Law et al., 2013). The risk of cardiac events in healthy individuals performing moderate- intensity activities is very low. (Mse and Kweyu, 2012). The risk of sudden death in athletes was found to be 1 in 200,000 (Maron et al., 1986). A study published in 1996 by American Family physician revealed that approximately 1 in 50,000 sudden cardiac deaths occur among marathon finishers therefore, considering this are vigorous trainers, the prevalence may be lower in moderate-intensity individuals.

With the numerous preventative and therapeutic health benefits associated with a physically active lifestyle, the effectiveness of exercise to treat various chronic diseases and the role healthcare providers can play in the promotion of physically active lifestyles, it can be regarded as a moral obligation for healthcare providers to take an active role in exercise prescription for the patient's sake (Weiler and Feldschreiber, 2012). While some insight has been gained into the practices and attitudes of healthcare providers towards exercise prescription in other parts of the world, nothing is known about the knowledge, attitudes and practice towards exercise prescription of Kenyan healthcare providers.

Kenya like most developing countries is facing a double burden of communicable and non-communicable diseases. Despite limited Data availability and quality, leading causes of death both in absolute numbers and in DALYs (disability-adjusted life-years) appears still to be due to infectious diseases (mainly HIV) and perinatal conditions while cerebrovascular diseases cause 6.1% of causes of deaths, and RTA (Road Traffic Accidents) and violence causes 2.5% of death and contributing 3.6% of DALYs. In turn, depression contributes 1.5% of DALYs (KHSSP 2013). In 2012 NCDs accounted for more than 50% of total hospital admissions and over 55% hospital deaths in Kenya (HMIS 2012). In July 2015, the Ministry of Health launched the National non-communicable diseases strategic plan 2015-2020 the strategic blue print for the national and county response to non-communicable diseases prevention and control for five years, the strategies recommended included putting up of policies that would facilitate prevention and control of non-

communicable diseases, policies may cut across from curriculum review to public policies.

A study in the United States done by (Garry et al., 2002) showed that majority of medical schools without a physical activity course in the curriculum had no plans to implement one. The study also suggested that substantive change in undergraduate medical education in the area of exercise prescription will not occur any time soon. In Kenya, there's limited data to affirm the inclusion of exercise promotion courses in the medical school's curriculum. Healthcare providers have an attitude that treatment goes before prevention and health promotion, so they are also more likely to counsel patients to be more active with aims to reduce the impact of a disease or injury that has already occurred (secondary prevention) rather than with intentions to prevent (Wee et al., 1999). Due to the attitude, there is likely to be reluctance to accept health promotion tasks as responsibilities of primary health care. An opinion made by Macauley (2015) a general practitioner regarding exercise prescription may be shared by many other healthcare providers. In his paper, he said that physical activity may be good for a person but general practitioners are not the key players. He continued and said that general practice is the care of the individual and physical inactivity is a social problem so doctors should not accept responsibility for a task they cannot deliver (Macauley, 2006). This opinion is worrying but unfortunately in Kenya nothing is known about the knowledge, attitude and practice of exercise prescription among healthcare providers.

Effective and wide use of individual approaches of PA promotion in the health care system can lead to substantial increase of PA for health (Vuori, 2013). Prescription of exercise can be done either verbally or can be a written recommendation for physical activity. In comparing a written prescription to verbal advice from a medical practitioner, research has it that the written exercise prescription approach was more effective (Marcus et al., 2006). Health providers are aware that PA has been mentioned as first-line treatment in guidelines for several diagnoses yet training in exercise prescription writing is lacking (Dunlop and Murray, 2013; Persson et al., 2013;). This calls for embracing "Exercise is medicine" which is a joint initiative of American College of Sports Medicine (ACSM) in collaboration with American Medical Association that calls for making physical activity assessment and exercise prescription a standard part of disease prevention and treatment.

This online open access tool (EIM) provides healthcare providers with a 'step by step' algorithm to prescribe exercise. An actual exercise prescription template is available for download and can be handed to the patient (<http://www.exerciseismedicine.org/>). Exercise is Medicine (EIM) is currently taking shape in most countries, "Exercise is medicine" has spread to over 40 countries with regional centers in North America, Europe, Latin America, Asia, China, Australia and in South Africa, the only African country it has taken shape (Sallis, 2015).

In Kenya EIM has not taken off yet therefore, it is unknown which platform healthcare providers in the country refer to while prescribing exercise to their patients

### Exercise prescription principles

Exercises can basically be classified into three groups: aerobic exercise (walking, jogging, bicycling and swimming), resistance training (weights), and flexibility exercises (Katz, 2012). The biggest quandary in prescribing exercise is not which therapies to use but in outlining the objectives and incorporating the correct components in the compilation of the exercise program for the specific patient (Sumchai, 2013). Exercise program should be designed and described in terms of the FITT principle which is based on the following four components (Ober, 2007; Sumchai, 2013; Warburton et al., 2006):

- Frequency - How often should a person exercise?
- Intensity - How hard should a person exercise?
- Time - How long should an exercise session last?
- Type - What is the modality of the exercise the person should engage in?

During 2013, the ACSM added two additional components (volume and progression) to accommodate both the principle of the cumulative volume of exercise which should be incorporated within the exercise program and the physiological adaptations associated with regular PA which will call for progression within the exercise prescription.

It is important to note that every person's exercise program should not necessarily follow the same type or dose of exercise as program required for treatment of overt or advanced disease differ from the exercise program required for disease prevention and general health promotion (Singh, 2002). As a general guideline, the ACSM recommends a weekly program to consist of the following for a healthy non-pregnant adult aged 18 to 65 (ACSM, 2010):

- Moderate-intensity aerobic PA for a minimum of 30 minutes, five days per week.
- Vigorous activity three days per week for a minimum of 20 minutes.
- Combinations of moderate and vigorous aerobic exercises three to five days per week.
- Resistance training two to three days per week.

The intensity of the aerobic exercises is deliberately lower than that of supervised cardiac rehabilitation programs (70% to 85%) (Fletcher et al., 2001) to lessen the probability of ischemia in an unsupervised setting (Thompson, 2005).

It is interesting to note that the new Canadian PA guidelines, specific guidelines for flexibility have been removed.

However, flexibility exercises are not discouraged (Tremblay et al., 2011).

The basic knowledge of exercise prescription is that

exercise programs should be designed and described in terms of the FITT principle which is based on the following four components (Sumchai, 2013):

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## Conclusion

Non-communicable diseases, such as cardiovascular disease, diabetes, and arthritis, are serious health problems affecting developing nations. Regular participation in PA is an important factor in the prevention and management of non-communicable disease like cardiovascular disease and diabetes (Colberg and Sigal, 2010; Mac Donald 2012; Macfarlane and Thomas 2010; Frazoni et al 2005). Research has proven that exercise health behaviors among patients improved significantly with lifestyle counseling (Lewis and Lynch, 1993; Calfas et al., 1996; Pinto et al., , 2001; Grandes et al., 2009). This calls for healthcare providers in developing nations to embrace Exercise in medicine. Exercise is Medicine initiative calls for all clinicians to prescribe exercise to patients as needed and appropriate at every visit (Jonas and Phillips, 2009). Professional organizations like the American College of Preventive Medicine, the American Academy of Family Physicians, the American Academy of Pediatrics, the American College of Obstetrics and Gynecology, the American Heart Association, National Institutes of Health, and the Surgeon General advocate for exercise prescription by healthcare providers and therefore health providers in developing nations should be flexible to embrace EIM (Jacobson et al., 2005; Sallis, 2009).

## Recommendations

More studies should be done to examine the results of

various approaches to exercise counseling to identify the most effective methods of increasing exercise counseling among healthcare providers in developing nations.

Future training curriculum for health care providers should include topics on: strategies to improve patient motivation to exercise, current exercise recommendations, exercise prescription, exercise screening and information regarding determining patient's stage of change for readiness to exercise.

Further research is needed regarding the promotion, implementation of the Exercise Is Medicine initiative by health care providers in developing nations. Future studies need to examine the effects of both Exercise is Medicine-specific training for health providers and interventions in these populations using Exercise is Medicine.

Policy changes for exercise promotion by health care providers in developing countries is necessary. Research documented major barriers to exercise counseling included lack of reimbursement and a perception of the healthcare system focus on prescription distribution as opposed to health promotion and disease prevention. Policy is needed to influence the recognition of the benefits of physical activity and its proven association with prevention and control of non-communicable diseases (Sallis, 2009).

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