Medical screening and evaluation prior to exercise participation

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SUMMARY
To optimize safety during exercise testing and performance, and to permit the development of a sound and effective exercise prescription, initial medical screening of participants relative to important health factors is necessary for both the apparently healthy and those with chronic disease. The need and importance of medical screening prior to exercise training is the focus of this paper. The paper highlighted on various medical examinations and their importance in exercise programme design. The need for medical supervision was also stressed. The paper concluded that people with significant disease risk factors should seek medical advice before exercising. The paper recommended that bodies responsible for health care delivery should encourage and facilitate policy that will mandate both professional manpower and screening infrastructure as a prerequisite for the establishment of physical fitness centre in Africa.


Introduction
The benefits of physical activity are well established and emerging studies continue to support an important role for habitual exercise in maintaining overall health and well being [1,2]. The word, physical fitness is fast gaining ground in Africa today. This is due to the increased awareness of the continent to the benefits of being physically fit, evidence of this is the numbers of recreational centres, fitness centres and playing grounds scattered all over, even hotels were not left out. The general complain has been lack of qualitative and medically packaged fitness programme. Most people can exercise safely if they are in good health and follow basic training principles. However, exercise may pose a risk to health and well-being if there are pre-existing medical conditions such as heart disease. People sometimes die suddenly from heart attacks, some of them during exercise [3, 4, 5]. Also many people decide that exercise is too difficult before they even try it, not realizing that the appropriate exercise type, and intensity varies depending on individual characteristics, current fitness level and specific health concerns [6]. The way to avert these abnormalities is through medical evaluation, which is a precursor to qualitative fitness programme [7].

Unfortunately, although a comprehensive medical evaluation is useful and desirable before prescribing exercise. Many people cannot afford the cost of such evaluation [4] and the medical system in this part of the world is not prepared to provide this service to the total population, even if money were available. According to American College of Sports Medicine [ACSM] [2], American Heart Association [AHA] [8], Fletcher [9], medical evaluation prior to prescribing exercise in a presumed healthy population has not been proven to reduce the medical risks associated with exercise. For this reason, guidelines or recommendation have been established that attempt to target the higher risk population.

According to Wilmore and Costill [6], people at high risk are those who have two or more major risk factors for coronary heart disease (CHD) risk factors or symptoms of cardiopulmonary (CR) or metabolic disorder. CHD risk factor and symptoms of CR or metabolic disease have been fully discussed elsewhere.
These factors could make exercise dangerous. Supervised exercise programmes are particularly recommended for symptomatic and cardiorespiratory disease patients who are considered by their physician to be clinically stable and who have been screened and cleared by the physician for participation in exercise programme [2]. The purpose of this paper is to review the need and role of medical screening and evaluation as a precursor to a sound physical fitness programme in Africa.

Medical Examination
To optimize safety during exercise testing and participation and to format the development of a sound and effective exercise prescription, initial screening of participant relative to important health factor is necessary for both apparently healthy and those with chronic disease [5]. In general, before beginning any exercise programme that includes vigorous activity, the following persons should have a complete medical examination by a physician: men above 40 years of age, females above 50 years of age, or any person with significant health problem [5, 6]. People with high risk should seek medical evaluation. The evaluation should include medical history, physical examination and appropriate procedures such as blood chemistry, blood pressure, functional capacity, and resting electrocardiogram. People of any age who experience any unusual symptoms, such as chest pain, viral infection, irregular heart beats shortness of breath, severe pain in muscle, joints or skeleton, should consult a physician before an exercise programme [5].

Owing to some factors earlier stated, delimiting the total population in medical evaluation prior to exercise participation the British Columbia Ministry of Health [BCMH][10] has developed a Physical Activity Readiness Questionnaire (PAR-Q) to determine if a person can safely participate in an exercise programme. Those who answer ‘Yes’ to any question should see their physician before beginning exercise programme and those who answer ‘NO’ to all question can start a low to moderate intensity exercise directly [10,11]. PAR-Q is an excellent tool for helping determine if medical clearance is necessary.

Red flag signs and symptoms
Patients with exercise-related syncope or presyncope require further evaluation to rule out structural cardiovascular disease [4, 14] Syncope or presyncope may indicate left ventricular outflow tract obstruction, arrhythmia, or congenital coronary anomalies. More benign causes include vasovagal syncope, exercise-associated collapse, hypoglycemia, and medication use [12, 3] Patients should not participate in athletics during this evaluation. [14] If syncope or presyncope remains unexplained, the patient should be referred to a cardiologist. Symptomatic patients should be evaluated thoroughly before returning to athletic participation [4, 15]

Medical and Family History
The pretest medical history should be thorough and include both recent and remote past history. The components of a patients’ medical history should include medical diagnosis (cardiovascular disease, asthma, anemia, diabetes, pregnancy, osteoporosis, eating disorder etc), orthopedic problems (arthritis, joint swelling, and any condition that hinder ambulation), medication use, during allergies and other habits (caffeine, alcohol, tobacco or recreational during use), family, social and work history [2].

A family history of premature sudden death (i.e., younger than 50 years) or significant cardiovascular disease is a red flag, [7, 12, 13] and further details should be sought. A family history of premature sudden death is particularly relevant in identifying hypertrophic cardiomyopathy and is a major risk factor for long QT syndrome, arrhythmogenic right ventricular cardiomyopathy, Marfan syndrome, and coronary anomalies. ECG, echocardiography, exercise stress testing, and lipid panels should be used to evaluate for structural cardiovascular disease. Specialized testing or cardiology referral should be considered [7].

Physical Examination
The physician should perform physical examination, or other qualified personnel like the physiotherapist or exercise physiologist etc. Physical examination components such as body weight, body composition (percent body fat), neurological function test, including reflexes, palpation and inspection of the lower extremities for edema and presence of arterial pulse should be done. Auscultation of the lungs, palpation of cardiac apical; impulse, auscultation of lung, palpation of cardinal apical impulse, auscultation of the heart with specific attention to murmur, Because cardiovascular abnormalities are difficult to detect,
family physicians should use standardized history questions and physical examination techniques to maximize the effectiveness of the preparticipation evaluation [16].

**Cardiovascular Assessment**
The leading cardiovascular causes of non traumatic exertional sudden death in young athletes are Hypertrophic cardiomyopathy, Left ventricular hyper trophy, Dilated cardiomyopathy,Aortic stenosis, Commotio cordis (i.e., blunt trauma to the chest causing ventricular fibrillation), Coronary artery anomalies, Myocarditis [17, 18] Measuring the resting blood pressure (BP) is an integral component of the pretest evaluation. Decision should be based on the average of two or more BP readings measured during each or more visits following an initial screening. Optimal BP with respect to cardiovascular risk is SBP less than 120 mmHg and DBP less than 80 mmHg; low readings should also be evaluated for clinical significance [2].

Blood pressure information for the purpose of classification of hypertension as recommended by the Joint Committee on Detection, Evaluation and Treatment of High Blood Pressure [19]. According to ACSM [2] resting DBP greater than 115 mmHg or resting SBP greater than 200 mmHg are relative contraindications to exercise testing while SBP greater than 260 mmHg and DBP greater than 115 mmHg are relative indication to terminate an exercise testing.

**Blood profile analysis**
An increased blood cholesterol level specifically a high concentration of low density lipoprotein (LDL) cholesterol or a low concentration of high density lipoprotein (HDL) cholesterol, increases the risk of CHD. Conversely, lowering total cholesterol and LDL-cholesterol reduces the risk of CHD [2, 5, 6, 20]. Classification of individual cholesterol and lipoproteins concentration and information on which treatment decision has been provided by the National Cholesterol Education Programme (NCEP) [21].

The desirable total blood cholesterol concentration is less than 200 mg/dl (5.2 mmol/L) and HDL less than 35 mg/dl (0.9 mmol/L). Multiple analysis blood profiles are commonly performed in clinical exercise programme. Such profile may provide useful information about an individual overall health status and ability to exercise and may explain ECG abnormality. There are various blood chemistry such as hemoglobin (Hb), fasting blood glucose, haematocrit, creatine and others [2].

**Pulmonary function**
Pulmonary function assessment via routine spirometry is another test often used, particularly in patient with diagnosed pulmonary disease or who present with a medical history or physical examination that warrants assessment of basic lung function. Many spirometric tests are available; the most commonly used include FVC, FEV, FEV/FVC ratio and MVV. Normal values for lung function are based on age, gender and height [2]. Typical effects of obstructive and restrictive pulmonary disease on spirometric volume and flow measurement has been established and documented [22].

**Functional capacity test (Exercise Tolerance Test [ETT])**
Functional capacity tests can be subdivided into laboratory or field tests. Laboratory tests are more accurate and reliable than field tests, but they tend to be more expensive and technically difficult to perform. In both laboratory and field methods maximal oxygen consumption (Vo$_2$max) are measured using treadmill, bicycle ergometer, arm ergometer running and bench stepping. Test can either be maximal or submaximal. The advantages of submaximal tests are that they are physically less demanding, take less time and may be safer but less accurate while maximal test provides a better physiological profile of the subject and can produce diagnostic charges in the ECG that may be missed during submaximal tests [2, 5, 6].

Many physiological measurements are possible during ETT, some of these measurements including EGG, HR, BP and RPP; examine the performance of the heart during exercise. All tests should follow established guidelines such as those of the ACSM [2] and AHA [8] for conducting graded exercise test. These guidelines include physician supervision, safety of equipment, contraindication and criteria for stopping a test (such as fatigue, critical level of ST segment depression, arrhythmia, angina etc).

A number of physical factors must be considered to ensure standardization and consistency including comfortable clothing, room temperature, pretest diet: light carbohydrate meal three to four hours. Prior to the test may be permitted, cigarette and caffeine product
should be avoided, medication which depend on the reason for the test because some drugs interfere with exercise performance. Also legal consideration (informed consent and human rights). All aspects of an ETT should be documented; any abnormal symptoms or physiological responses should be recorded on a standardized form. This precaution is important for both the subject (patient) and the test administrator [2,5]. The result of ETT may be used in the classification (fitness status) of individuals prior to and after exercise training. Medical supervision

Non diagnostic test (ETT) on apparently healthy individual can be safely administered without direct physician supervision. Examples of non-diagnostic tests are the physical fitness test used and administered by the Young Men Christian Association [YMCA] or Symptom Limited Graded Exercise Test (SL-GXT) given to athletes for the purpose of determining their \( V_{O_{2}}\max \) [22,23]. If a GXT is for a diagnostic purpose or is performed on persons with CHD or where are high risk for such disease, also those with less than 8MET (metabolic equivalent) direct medical supervision is necessary. Qualified personnel, appropriate drugs (emergency drugs) and equipment are important and should be available [2,5]. Importance of medical evaluation

Medical screening (evaluation) is a useful and important part of the exercise prescription for many reasons as documented by ACSM [2], Wilmore and Costill [6]. A comprehensive medical evaluation will help identify high risk individuals who should not exercise at all or should be restricted to exercising only under medical supervision. The information obtained in medical evaluation can be used to develop the exercise prescription. The valves obtained from certain clinical measures such as BP, body fat content and blood lipid levels can be used to motivate the person to adhere to the exercise programme.

A comprehensive medical evaluation, particularly of healthy people can provide a baseline against which any subsequent changes in health status can be compared. Many illness and diseases such as cardiovascular diseases can be identified in their earliest stages when chances of successful treatment are much higher. For the identification of individuals with other special needs.

**Recommendation**

Bodies that are responsible for the control of sports, medical practice and healthcare delivery (Sports Councils/NGOs, Medical Council, Medical Rehabilitation Therapist Board, Association of Sports Medicine Practitioners etc) should through government, formulate policy that will mandate medical specialist, evaluation and medical screening infrastructure as a prerequisite for the establishment of physical fitness, recreational clubs, local and national stadia.

**Conclusion**

Exercise training is not appropriate for everyone. Some medical conditions make exercise dangerous; in light of this, people with significant disease risk factor should seek medical advice before engaging in exercise programme. Also, apparently healthy populace should seek medical screening, evaluation and adhere strictly to expert prescription.

**References**

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