

Aerobic Exercise Intervention as Part of Management Options for Depression and Anxiety

MYFRIEND BULUS KPAME
University of Maiduguri, Nigeria.

Jatau Richard
University of Jos, Nigeria.

Abstract. From antiquity to the present day, exercise has been used as means of preventing diseases, and promoting health and well-being. Hence, this paper attempts to assess the results of several studies on the effect of aerobic exercise intervention in the management of mental health and well-being, precisely depression and anxiety. The data derived from this reviews shows that exercise is beneficial to mental health; it reduces anxiety, depression, and negative mood, and improves self-esteem and cognitive functioning. Exercise is also associated with improvements in the quality of life of those living with schizophrenia. The improvement in the depression and anxiety observed in most studies come as a result of body's ability to regulate and release pain killers during exercise. The natural pain killers produce physiological and psychological effects that lead to feeling of calmness and improve mental health. However, despite these positive effects derived from exercise, it seems that exercise is rarely recognized and utilized by concerned health care professionals as an intervention in the management of mental health problems. Thus, the essence of this presentation. Exercise of the aerobic nature performed at moderate intensity, three to five times a week is more beneficial in improving mental health. Such aerobic exercise may be in the form of brisk walking, rope skipping, cycling, swimming, jogging, stair climbing, dancing, gardening and so on.

Keywords: mental health, aerobic exercise, natural killers, schizophrenia

1. Introduction

Mental health is a broad topic that includes many conditions that affect the individuals' level of functioning. Mental health is much more absence than mental illness. It involves both the physical and

mental well-being. It is about having the capacity to live full and creative life, and equally have the flexibility to deal with every problem. The mind arena (emotions and will) has needs just as the body has needs for physical fitness. As pointed out by Peck (1978), love is the basic of the mind, but for a good mental health we also need beauty, friendship, recreation, exposure to nature, challenges, meaningful work, a sense of self-worth and other mental trends. Some of the mental health conditions that affect millions of people today are depression and anxiety.

Depression can be described as an emotional disorder characterized by profound sadness. The pocket medical dictionary categorizes depression clinically in two types: neurotic and psychotic.

The neurotic type occurs as a recreation to stress, while psychotic arises spontaneously from the mind (endogenous). The symptoms of each vary with the severity of the condition, but generally, neurotic depression is presented with insomnia, headache, exhaustion, anorexia, irritability and emotionalism. The symptoms of endogenous depression are more severe but respond better to treatment. Some of the striking symptoms of depression are emotional changes. The emotional characteristics of depression are feeling of self-worthlessness, loss of interest in things close by, impaired concentration and occasionally, suicide thoughts. All of these feelings have negative health consequences.

The World Health Organization's report (WHO, 2000) shows that depression is a significant mental health problem afflicting people living in all member states. The condition ranked eighth accounting for 2.8% of Disability Adjusted Life Years (DALY's) among men and third (5.8%) of DALY's among

women. The organization (WHO) classified depression as one of the leading causes of disability worldwide.

Anxiety and stress are sometimes used interchangeably to indicate the level of arousal of the body system in response to a need. At every stage of life certain level of arousal is necessary for optimal performance. Anxiety and stress become health problems when they arise above a certain limit. Arousal can be positive or negative depending on the level and situation.

A lot of studies have demonstrated that regular exercise is associated with reduced risk of numerous life threatening illness. While most studies focus on the physical and health benefits of exercise, many other research works have also indicated that exercise promotes wellness and mental health. Many studies (Dimeo, Bauer, Varahram, Proest & Halter, 2001; Dunn, Trivedi & O'Neal 2001; Lappämäki, Partonen, Hurme, Haukka & Lönnqvist, 2002) have indicate that physical activity might be an effective measure in the treatment or even management of psychiatric conditions (Camacho, Roberts, Lazarus, Kaplan & Cohen, 1991; Paffenbarger, Lee & Leung, 1994). Peluso & de Andrade (2005) also observed that physical activity can be an auxiliary tool in the prevention and treatment of psychiatric diseases, and also a tool in the promotion of a more satisfactory quality of life. Studies by Booth & Laye (2010) and Lambourne & Tomporowski (2010) indicated that both physical and psychological symptoms are improved by physical exercise.

Caspersen, Powell and Christenson (1985) defined exercise as a subset of physical activity that is planned, structured, repetitive and purposive in the sense that the final or an intermediate objective is the improvement or maintenance of physical fitness. The authors defined physical activity as a term that describes any bodily movement that is produced by skeletal muscles that results in energy expenditure. According to National Heart, Lung and Blood institute (NHLBI) (2007), exercise is classified into three as follows: aerobic, anaerobic and flexibility exercises. This classification depends on the overall effect they have on the human body. For instance, Wilmore & Knuttgen (2003) asserted that aerobic exercises, such as cycling, swimming, walking, rope skipping, rowing, running, hiking or playing tennis focus on increasing cardiovascular endurance. Anaerobic exercise, such as weight training or sprinting, increase short-term muscle strength, while flexibility exercise, such as stretching, improves the range of motion of muscles and joints.

Aerobic exercise is the most common form of exercise training and it is easily accessible and affordable by any individual. According to United States Department of Health and Human Services report (USSDHH) (1996), aerobic exercise utilizes the oxidation of glucose, fatty acids and amino acids in the mitochondria. In essence, aerobic exercise uses a great amount of oxygen to keep the muscle groups working continuously at intensity that can be maintained for at least 20 minutes, thereby placing a lot of demand on the cardio-respiratory system to supply oxygen to the working muscle. Bouchard, Shepherd, & Stephens (1993) reported that aerobic exercise improves physical and mental health in general population, thus it is recommended not only for the reduction of the risk of degenerative and hypokinetic diseases, but also for mental illness such as depression and anxiety.

Bearing the above assertions in mind, this paper attempts to look closely at the association between aerobic exercise and two mental health conditions (depression and anxiety) that are detrimental to effective functioning of people in the present life.

2. Aerobic Exercise and Depression

It is a well-documented fact that apart from physical benefits, aerobic exercise can contribute to the improvement in mental health. As indicated earlier, one of the devastating mental health problems in the society today is depression. The physical benefits of regular exercise are much more than physical. Physical activity has huge mental benefits. Studies from empirical and anecdotal data show that exercise may have an antidepressant effect even in healthy individuals. Green & Reid (1999) reported that the effect of exercise among people with multiple disabilities. Similar results were reported by Faulkner and Sparkes (1999) for people living with schizophrenia. They reported that exercise reduces auditory hallucinations, raises self-esteem and improves sleep patterns schizophrenic individuals.

The relationship between depression and exercise cannot be over emphasized. Schmitz, Kruse & Kugler (2004) stated that exercise can improve mental health conditions such as anxiety, depression and general well-being. They explained that exercise is associated with a decreased risk of developing clinically defined depression, and also treated moderate and severe depression. The anti-depressant effect of exercise has been found to be the same with other psychotherapeutic interventions. North McCullagh & Tran (1990) reported that exercise improves depression by changing people's daily routine,

increasing their interactions with others, helping them lose weight, participate in outdoor recreation and master difficult physical and psychological challenges.

Mechanism by which exercise affects depression can be classified into physiological, psychological and social. The psychological mechanism is directly related to biological factors. The biological factors are explained by five hypotheses. These are the thermogenic, endorphin, monoamine, stress hormone and anti-inflammatory hypotheses. The proponents of these theories believed that exercise rises the core body temperature and this leads to improved mood. It is believed that when temperature rises in specific regions of the brain, precisely, the hypothalamus situated in the brain stem, it leads to overall feelings of relaxation and a reduction in muscle tension.

The endorphin hypothesis however explains that the mental benefits of exercise arise from the increase release of Beta-endorphin and this enhances the sensation of calmness (Dunn & Dishman, 1991; Nicoloff, 1995). Monoamine theory explained the psychological benefits of exercise to the increase in neurotransmitters. It is believed that exercise increased the release of transmitters such as serotonin, dopamine and norepinephrine. A balance in these substance will alleviate mental illness and improve mental well-being. Allen (2000) however, observed that inhibitory effects of these substances in the central nervous system (CNS) are responsible for the sensation of calm and improved mood. A lot of researchers have supported this theory (Ransford, 1982; Morgan, 1985). Pert & Bowie (1979) documented evidence from animal studies which suggest that exercise stimulates the secretion of endogenous morphines called endorphins that produce a state of euphoria. Equally, Taylor, Boyajian, James, Woods, Chicz-Demet, Wilson, & Sandman (1994) Stated that the body release endorphin during exercise and this increase the feelings of happiness, better sleep and more energy which collectively fight against depression and other chemical imbalance in the body.

The stress hormone theory explained the mental benefits of exercise on inhibition of the secretion of the stress hormone. This theory states that most mental health problems are as a result of imbalance in stress hormone such as cortisol, norepinephrine and noradrenaline. Research reports (Babyak, Blumenthal, Herman, Khatri, Doraisewamy Moore, Craighead, Baldewicz & Krishman, 2000; Lawlor & Hopker, 2001) have shown that exercise can reduce the levels of these hormones. It has suggested by

Cotman, Berehtold & Christie (2007) that such mental disorders (anxiety, depression and schizophrenia) are associated with high levels of inflammation mediators and that exercise may be beneficial due to its anti-inflammatory and health promoting effects.

The psychological and social mechanisms are explained by the distraction and self-efficacy, and social interaction hypothesis respectively. The distraction hypothesis states that exercise distracts an individual from worries and distressing thoughts, while at the same time increasing the individual self-efficacy and self-confidence. This leads to positive self-image.

The social interaction theory sees exercise as a means of social interaction expanding the social horizon of the participants (Peluso & de Andrade, 2005). The interaction has antidepressant effects leading to improved mood and reduced level of depression and anxiety. Bingham (2009) observed that exercise has a low to moderate effect in anxiety. While exercise training can reduce trait anxiety, a single exercise session can reduce short term physiological reactivity to brief psychological stressor and enhance recovery.

There are also epidemiological evidence which suggest that physical activity is associated with a decreased risk of developing clinically define depression. Experimental studies (Babyak et al., 2000; Dunn, Trivedi, Kampert, Clark & Chambliss, 2005; DeMoor, 2006) have shown that the antidepressant effect of exercise can be of the same magnitude with other psychotherapeutic interventions. Mutrie (2012) reported that a person's risk of becoming depressed is doubled if he/she is inactive. It has also been suggested by researchers at Yale University that a "natural high" gained from exercise could be formulated for use in medication to help people suffering from depression.

On the basis of a systematic review of the effect of exercise on depression as measured by Beck Depression Inventory (BDI) scores, Lawlor & Hopker (2001) reported that exercise produced a large decrease in depression symptoms when compared with no treatment. In other words those who exercised were less depressed and score lower on the BDI than those who did not exercise. However, Geddes, Butler & Hatcher (2003) posited that exercise has limited effectiveness in the treatment of depression. This view conflicts with National Quality Assurance Framework for Exercise (NQAFE) (Department of Health, 2001) which states that exercise has fundamental impact on mental health problems including depression. Also, Grant

(2000) commenting on the National Consensus Statements on exercise and mental health published by the Health Education Authority stated that exercise is consistently associated with positive effect on mood and psychological well-being.

3. Aerobic Exercise and Anxiety

Barlow (2002) defined anxiety as an unpleasant mood characterized by thoughts of worry associated with adoptive response to perceived threats that can develop into a maladaptive anxiety disorder if it becomes severe and chronic. According to Korostil & Feinstein (2007), anxiety symptoms and disorders are common among individuals with chronic illnesses. Stein, Roy-Byrne, Craske, Bystriksy, Sullivan, Pyne, Katon & Sherbourne (2005) were worried that health care providers often fail to recognize or treat anxiety and may consider it to be unimportant response to a chronic illness, despite the latter observation made by Korostil and colleague. Based on this neglect by health care providers, untold personal costs of anxiety are borne by patients. These costs, according to Kessler, Ormel, Demler & Stang (2003), Sareen, Jacobi, Cox, Beilk, Clara & Stain (2006) and Kroenke, Spitzer, Williams, Monahan & Lowe (2007), include increased disability and role impairment, reduced health-related quality of life and consistent health care visits respectively.

Petruzzello, Landers, Hatfield & Salazar (1991) conducted three meta-analytic reviews to examine the effect of acute and chronic exercise on state (current) anxiety, trait (dispositional) anxiety and psychophysiological correlates of anxiety and found that chronic exercise had a slightly better effect on anxiety than acute exercise. The effect of exercise was largest in pre-post test within groups designs aerobic exercise was better than anaerobic exercise, and high intensity exercise of 21-30 minutes duration had a better effect than low intensity exercise shorter than 20 minutes or longer than 30 minutes. Effect size was largest when anxiety was measured 20 minutes post-exercise. Effect sizes were largest in participants age between 31 and 45 years.

When trait anxiety was the outcome measure, the effect size for exercise was moderate. High intensity exercise aerobic exercise or more than 40 minutes duration, performed for more than 15 weeks produced the highest effect sizes. Effect sizes were largest in participants age below 18 years. For trait anxiety, exercise has the largest effect in people with psychiatric illness. When psychophysiological correlates of anxiety were the outcomes measures, exercise had a fairly large effect on anxiety. Acute

exercise had a better effect on psychophysiological outcomes than chronic exercise. Pre-post within groups designs produced larger effect sizes than other designs. Lower intensity exercise of up to 20 minutes duration, lasting 4-6 weeks produced the largest effect sizes. Effect sizes were largest in studies using matched controls, among 18 to 30 years old and those with a psychiatric illness. The result from these detailed meta-analyses showed that aerobic exercise is associated with reductions in anxiety, although the effects were not uniform across the three outcome measures. The variable that was significant across all outcome measures was duration of exercise. Exercise of more than 20 minutes appears necessary for reduction in anxiety levels, irrespective of how anxiety is measured.

DiLorenzo, Bargman, Stucky-Ropp, Brassington, Frensch&LaFontaine (1999) investigated the effects of exercise on self-reports of depression, anxiety and self-concept, and aerobic fitness, heart rate and maximum oxygen uptake. Eighty-two participants aged between 18 and 39 years were randomly allocated to a 12-week programme of bicycle ergometry or a control condition and followed up 12 months later. At the end of the programme and at follow-up, the participants allocated to the exercise programme had more positive changes in all outcomes than the participants in the control.

Studies investigating the role of aerobic exercise on health using qualitative research methods are rare. However, Faulkner & Sparkes (1999) used an ethnographic design i.e. participants observation and interviews to explore therapeutic value of a 10-week aerobic exercise programme of twice weekly sessions for people living with schizophrenia. The authors found that aerobic exercise reduced the participants' perception of auditory hallucinations, raised their self-esteem, improved their sleep patterns and general behaviour. The scholars concluded that aerobic exercise provided distraction and social interaction, and these accounted for the aerobic exercise benefits. However, it is unclear from this study how aerobic exercise interacted with other interventions, like medication and counseling that might have produced the positive outcomes. Notwithstanding this limitation, the ethnographic design allowed the researchers to study intensively the participants' experiences. The results of their study supported the therapeutic value of exercise and it collaborates with the findings of many quantitative studies and this collaboration lends further support to researchers' claims that exercise improves mental health.

4. Conclusion

It can be concluded from the extensive review that exercise improves and promotes mental health and well-being, reduces depression and anxiety. Although exercise seems to improve the quality of life of those living with mental health problems, its value is seldom recognized by mainstream mental health services. The improvement in depression and anxiety observed in most studies comes as a result of the body's ability to regulate and release pain killers during exercise. These natural pain killers produce physiological and psychological effects that lead to feeling of calmness and improved mental health.

5. Recommendations

- It is important to realize that exercise can be taken in any form, but most importantly, it should be an activity to be enjoyed and cherished in order to derive its benefits as well as encourage adherence to participation.
- Exercise of aerobic nature performed at moderate intensity, 3-5 times a week is more beneficial in improving mental health. Such aerobic exercise may be in the form of brisk walking, rope skipping, cycling, swimming, jogging, stair climbing, dancing, gardening, etc.

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