Comparison between the Classical Symphony and Self Selected Music on Muscle Endurance in Young Obese Males

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Abstract

Introduction: Music captures attention, triggers a wide range of emotions, regulates mood and arousal, increases work output, induces states of higher functioning, reduces inhibitions and encourages rhythmic movement. Music has ergo-genic effect as well.

Aim: To evaluate the comparison between classical symphony music and self selected music on muscular endurance levels in young obese males.

Materials and Method: BMI assessment was performed for all participants and the 30 individuals falling under obese category were recruited in the study (BMI ›30 Kg/m^2). The participants were asked to listen to classical symphony music 15 min for 20 days, the muscle endurance test was done by Mosso's ergography and hand dynamometry. After a month the same participants were recalled. The participants were asked to listen to any music of their choice and were grouped under self-selected music. Muscle endurance test was done by hand dynamometry and Mosso's ergography method. Both the values of muscle endurance were compared by using independent paired t test and SPSS software statistical assessment tools were used.

Result: After using self-selected music the muscle endurance significantly increased using hand dynamometry ($p<0.005$) and Mosso's ergography ($p<0.05$).

Conclusion: There may be an improved functioning of neural system due to the influence music. Therefore, music may be used as an additional aid for obese individuals to maintain their skeletal muscle endurance during any physical activity and aerobic exercise

Keywords: *Physical activity, Music, Mosso's ergography, Hand dynamometry.*

Introduction

Obesity is one of most neglected public health problems. Exercising helps to improve body composition and decrease body fat and body weight**(1).** Nowadays it has become a big concern for the youth of today's generation. Accumulation of fat has been classified as mild overweight (excess fat of 20% to 40%), moderate (41% to 100% overweight), and severe (over 100% overweight)(2). It exposes the person to make health risk conditions like sudden death, diabetes of type 2, cardiovascular diseases, sleeplessness, depression and osteoarthritis. It can be a genetic problem or a disorder that is caused due to unhealthy lifestyle habits. Obesity results in sudden disturbance in physical activity as well as emotional disturbance and also a important cause for chronic health problems**(2).** Music is an ergogenic aid. The common positive outcomes when combining music

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and exercise appear to be decreased ratings of perceived exertion, increased performance measures, improved mood and increased arousal [3].

Karageorghis has indicated that music is used to alter psychomotor arousal and thus can act either act as a stimulant or sedative. Music reduces a performer's attention therefore the person gets diverted from sensations of fatigue and tiredness and enhances the positive dimensions of mood like happiness, vigor and tempers anger, depression, tension**[4].** Music plays a significant role in emotion, raises spirits, regulates mood**[5],** evokes memories, increases work output and also induces states of higher functioning and reduces inhibitions. In sports science, there is evidence of a positive effect of music on grip strength and performances in other physical activities and other endurance **[6]** thus, music is a powerful key. Lack of sufficient physical activity is a significant factor for obesity. If there is a positive relationship between music and exercise performance (e.g., duration, intensity) the music could help to increase exercise adherence/reduce exercise dropout[7].

The preferred music may facilitate focus on the music or other external stimuli rather than the discomforts that often accompany strenuous exercise. Thus, music also has the capability to evoke pleasant associations, possibly masking unpleasant stimuli or serve as a distraction to internal feelings associated with pain and discomfort [8]. There are studies explaining the differences in slow beat and fast beat music on physical activity but there no research comparing the different types of music.

Listening to music during strength workouts has become a very common practice. Listening to music induced a significant increase of strength endurance performance and no effects on maximal strength [8]. Musical preference reflects the level of arousal needed to perform certain tasks [9]. Specifically, when doing physically demanding work or exercise, choosing inspiring music that the person preferably enjoys is a worthy strategy to follow [10]. A study has tested the effects of fast, energizing music and slow, relaxing music played prior to handgrip dynamometer performance [11]. Slow asynchronous music (< 110 bpm) is generally inappropriate for exercise or training contexts unless used to limit effort exertion or as an auditory backdrop for warm-up/cool-down activities. It has also been proven that there was a positive-linear relationship between exercise heart rate and music-tempo preference[12,13].

Therefore, the present study was conducted to compare the effect of classical symphony (<110 bpm) and self-selected music on muscle endurance. The goal of the present study was to examine which music (self-selected and classical symphony) influences the level of exercise intensity and duration.

Materials and Method

The cross sectional study was started after getting approval by institutional review board. Thirty one resistance-trained medical students were randomly selected and exposed to classical symphony music and self-selected music . The sample size was calculated based on the study by Bartolomei S et al [14]. After getting informed consent the study was carried out from April 2019 to July 2019. The study was conducted in Research lab, department of physiology, Saveetha medical college. The research lab was maintained with zero noise disturbances during the study.

The undergraduate students were identified from Saveetha Medical College aged 18 – 24years. Alcoholics, smokers, subjects with history of diabetes, hypertension and any student with musculoskeletal disorders were excluded. The procedures and benefits of the study were explained to the subjects, before starting each procedure. In this study only male participants were recruited as male has increased muscle mass compared to female. BMI assessment was done. The individuals falling under the obese (›30 Kg/m^2) category were recruited in the study.

Phase I: During phase I classical symphony music was shared to the participants in MP4 format (<110 bpm) prior to the study period. The music selected by the participants were left to their own choice. There was no particular intensity or frequency to choose self- selected music. Participants were asked to listen to classical symphony music for a period of 15 min for 20 days using headphones with closed eyes in a closed room to avoid external deviation. Participants were allowed to listen to the respective music anytime during these days. They were asked to perform hand grip test and Mosso′s Ergography after listening to the music on 20th day [15]. Endurance values were noted.

Phase II: The same participants were reassessed after a month and during this one month resting period the participants were allowed to have normal routine

life and not to listen to classical symphony music. They were asked to listen to self-selected music for period of 15 minutes for 20 days using headphones with closed eyes. On the 20th day the subjects were made to take muscle endurance test, using handgrip dynamometry & Mosso's ergography The tests were done in the research lab, Physiology department and monitored keenly by the investigator in the research lab. The values of muscle endurance by classical symphony music and self-selected music recorded on 20th day of each group were compared among obese male subjects using independent paired T- test.

Mosso′s Ergography test (joule): Subject was made to sit comfortably and asked to insert the index and ring finger into the tube holders and to lift the load by maximal contraction of middle finger until the muscle undergo fatigue. For every 30 sec, 500gms of weight were added. Work done was recorded as graph. Using mosso's ergography, formula used to calculate work done was W = F × S. W= work done, [where F = load in kg, S = sum of the vertical amplitude] in each ergogram

Hand grip test (kg): Proper instructions were given to the subjects: arm should touch lateral side of the body, the forearm should keep in 90^{o} then place the hand dynamometer in the participant's hand and request the participant to squeeze to his maximum, the needle will automatically record the force (in Kg).

Statistical Analysis: The results for Hand grip test and Mosso's ergography in obese individuals were compared before and after music using the independent samples T – test. Statistical significance was set at $p < 0.05$ using SPSS software version 26.0 .

Result

The mean age of the participants was 19.58 ± 2.0 years. Their mean BMI (Kg/m^2) was 33.4 ± 1.94.

Table 1: Hand Dynamometry: Comparison between Classical symphony music and Self selected music

Parameter	Mean±SD	P –value
Classical symphony music	29.83±2.63	0.021
Self selected music	47.27±4.09	

Table 1 and 2 indicates the values resulted in Hand dynamometer ($p<0.021$) and Mosso's ergography (0.003) respectively. These results clearly show that the work done improved after listening to self-selected music compared to classical symphony music.

Table 2: Mosso's Ergography: Comparison between Classical symphony music and Self-selected music

Parameter	Mean±SD	P –value
Classical symphony music	239.2±34.39	0.003
Self-selected music	330.35±20.75	

Discussion

The present study sought to examine the effects of different kinds of music on the exercise performance on muscle endurance in young obesity male subjects. Specifically, two different types of music were examined: self-selected (SSM) music, and classical (CSM) music. Many authors have indicated that overweight and obesity, expressed by the Body Mass Index (BMI), negatively influence the level of endurance-strength abilities.[4,16,17]

Survey-based data revealed that musical rhythm has a generic stimulative effect on the human organism irrespective of any synchronisation. Hence, in addition to activating few neural structures of brain in a periodic way in order to promote rhythmical movement, music may also cause significant stimulation of those parts of the brain that regulates arousal, namely the limbic and reticular activating systems [17]. Previous research suggests that exercise performance and duration can be influenced for at least two reasons: i) It is possible that the self-selected music provides higher levels of state motivation, thereby increasing exercise performance and endurance in the SSM as opposed to the CM conditions. ii) Listening to motivational music can help the exerciser experience more dissociative thoughts, taking the focus off of the potential discomfort of exercise and internal cues (e.g., self-talk).[18]

Several neural mechanisms may explain the ergogenic impact of music on short- term maximal exercise[19,20]. The present have used two method to measure muscle endurance in the young male subjects hand dynamometry and Mosso's ergography. Like a previous study, using mosso's ergography, subjects were asked to lift from low weight (500gms) to high weight (4000gms) by the middle finger maximal contraction until the subjects gets fatigue[21]. Some studies suggest that the introduction of music has a psychobiological impact on the exerciser demonstrated by changes in perceived muscle endurance [22].

The amount of physical activity performed overall, as well as the physiological response to the exercise, increased with exercise duration, in order to improve the benefits of exercise [23,24]. The present study also indicated that self-selected music has showed significant increase in muscle endurance. Energy and tiredness are often cited as reasons for why people don't exercise. However, exercise has a positive impact on both dimensions of affect. The present study showed significant increase in energy immediately following exercise.

There are numerous evidences to suggest that music, particularly high tempo, can have a positive impact on sporting performance particularly on muscular exercises. However, this has primarily been demonstrated in endurance based exercise rather than fine motor control activities [25-27]. It is interesting to note that performances were greatest in the present study when listening to self-selected music.

Negative aspects of affect, such as high levels of stress and tension, are often associated with an overall lack of well-being, decreasing feelings of tension and stress is an important aspect of regulating affect and mood disorders by listening music [28]. A study has demonstrated increased performance during an explosive exercise and an altered mood state when listening to self-selected music [5]. Therefore, listening to SSM might be beneficial for acute power performance. The current results showed significant changes in feelings of stress, tensions especially muscle endurance performance.

Limitations: The study population was chosen in a random manner and there are chances of bias. Only two types of music were compared to see the effect of muscle endurance. The work could be further extended with various types of music. The individual differences within the group and group differences were not done. The music intensity and frequency was not exactly fixed as they were asked to listen to self-selected music. The study can be further extended to compare the effect of degree of music on muscle endurance.

Conclusion

In light of this study finding, music can be used as an additional aid for obese individuals to improve their skeletal muscle endurance during any physical activity. As well as the music helps to change mood out & stress etc. Our research confirmed also the self selected music is the best one when compared to classical symphony music.

Ethical Clearance: The study was conducted after getting approval from institutional review board (SMC/IEC/2018/11/253)

Conflict of Interest: Nil

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