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THE EFFECTS OF LISTENING TO QUR'AN RECITATION ON THE PACE OF RELAXATION BASED ON THE MEASUREMENT OF HEART RATE RECOVERY FOLLOWING A HARVARD STEP TEST***Kesan Mendengar Bacaan Al-Quran terhadap Kadar Relaxation berdasarkan Ukuran Pemulihan Kadar Jantung mengikut Harvard Step Test***Tjut Sutjighassani, M Rizki Akbar, Samsudin Surialaga
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Abstract

Classical music has been the primary choice of non-pharmacological relaxation, Qur'an recitation has been also used traditionally. This research aims to compare the effects of Qur'an recitation and classical music on relaxation by evaluation of HRR following a Harvard Step Test (HST). HRR is used to assess cardiovascular fitness, main parameter of relaxation. This experimental cross sectional study uses 56 students with same amount of gender. Interventions were made to listen to the Qur'an recitation or classical music immediately after exercise. HRR were measured before exercise, 30", 1', 1.5', and 2' after exercise. The results showed statistically there is a significant decrease of HRR at 30", 1.5', and 2'. Clinically, male respondents showed a faster HRR decrease than women. The mean HRR of the Qur'an recitation has P value of T-independent test result $>0,05$. This value indicates that there is no significant difference between the two interventions. Therefore, it has been demonstrated that Qur'an recitation is as effective as classical music for relaxation and can be used interchangeably. It is also important to note that there is a trend of more normal HRR responses to the Qur'an listening group than the classical music group.

Keywords: classical music, heart rate recovery, Qur'an.

Abstrak

Muzik klasik sudah menjadi pilihan utama dalam non-pharmacological relaxation, bacaan Al-Quran pula digunakan dalam perubatan tradisional. Kajian ini bertujuan untuk membandingkan kesan bacaan Al-Quran dengan muzik klasik terhadap relaxation dengan penilaian HRR mengikut Harvard Step Test (HST). HRR digunakan untuk menguji daya ketahanan kardiovaskular, ukuran utama relaxation. Eksperimen ini menggunakan 56 pelajar, di mana kedua-dua jantina mempunyai jumlah yang sama. Intervensi dibuat agar responden mendengar bacaan Al-Quran dan muzik klasik selepas senaman. HRR yang diukur sebelum bersenam adalah 30", 1', 1.5', dan 2'. Selepas bersenam, keputusan yang ditunjukkan secara statistik mempunyai penurunan HRR pada 30", 1.5', dan 2'. Secara klinikal, responden lelaki menunjukkan penurunan HRR yang laju berbanding wanita. Keputusan HRR dengan bacaan

Al-Quran mempunyai nilai $P > 0,05$ dalam keputusan T-independent test. Nilai ini membuktikan tiada perbezaan yang signifikan di antara dua intervensi tersebut. Oleh itu, kajian ini membuktikan bacaan Al-Quran mempunyai efektif yang sama dengan muzik klasik dalam relaxation dan boleh diganti antara satu sama lain. Hal penting yang perlu diketahui juga berkenaan trend semasa, kebiasaannya HRR lebih memberi respon kepada bacaan Al-Quran berbanding muzik klasik.

Katakunci: muzik klasik, pemulihan kadar jantung, al-Quran.

INTRODUCTION

Heart rate recovery (HRR) is a value that states a decrease in heart rate in the resting phase after physical activity (Abu Hanifah et al., 2013). There are many things that can affect the frequency of the pulse including gender, age, body position, and physical activity. Sensory stimuli can affect changes in pulse and blood pressure hemodynamic status. The stimulus is received by the baroreceptors and is sent to the cardiovascular center in the medulla oblongata. Then the cardiovascular center will determine the frequency and strength of the heart rate (Handayani, Fajarsari, Retno Trisna Asih, & Naeni Rohmah, 2016; Sandi, 2016).

Listening to music is one of the non-pharmacological relaxation methods that can be used to accelerate post-exercise HRR. One effective relaxation method is listening to music; music therapy (Faradisi, 2009). Music therapy is widely used as a non-pharmacological relaxation method for being simple, non-invasive, safe, inexpensive, and effective (Hertanti, Setiyarini, & Kristanti, 2015).

Music therapy has proven to be useful in the healing process because it can reduce pain and relaxing. Music stimulation increases the release of endorphins which causes a shift of attention from pain and reduces anxiety (Faradisi, 2009; Rihiantoro, Nurachmah, & Hariyati, 2008). Listening to the Qur'an is also proven to be able to provide a relaxation effect and is predicted to be an alternative to classical music (Mirbagher Ajorpaz, Aghajani, & Shahshahani, 2011). Based on Handayani (2016), reading or listening to the Qur'an is proven to provide a relaxation effect, so the heart rate decreases. According to Ajorpaz (2011), Qur'an recitation and slow-tempo classical music have been shown to reduce anxiety, pulse and blood pressure in patients with pre-abdominal surgery.

However, the Qur'an recitation and classical music relationship against HRR has not known. The purpose of this study is to determine the effects of listening to Qur'an recitation and classical music on the pace of relaxation based on the measurement of HRR following a HST.

METHODS

In general, physical exercise causes an increase in pulse frequency. If physical exercise is carried out regularly and continuously for a long time, there will be a decrease in the frequency of heart rate recovery (HRR) (Handayani et al., 2016). This study is a cross-sectional experimental study of respondents who met the inclusion criteria, namely students of the Department of Medicine's Undergraduate Education Program in Medical Faculty of Universitas Islam Bandung with age range of 19 until 23 years old, and fulfilled the exclusion criteria. These exclusion criteria are unable to complete the HRR measurement, have a history of heart and lung disease, have a hearing loss, and have limited lower limbs movement.

The Harvard Step Test (HST) is used to assess the cardiovascular endurance of the test subject. Cardiovascular fitness is the body's ability to use oxygen as an energy source. It can be tested with several physical exercises, one of them is the HST. The HST includes motion of climbing up and down of a bench at predetermined speed (Mexitalia, Uemura, Yamauchi, & Anam, 2012).

In this study, 56 research subjects were divided into two groups, namely classical music group and Qur'an recitation group consisting of 14 male subjects and 14 female subjects in each group. Subjects' initial heart rate were measured then the subjects were asked to perform HST for three minutes maximum. As soon as the exercise was over, the subjects' heart rate was measured while listening to the classical music or Qur'an recitation (Al-Mulk by Taha Al Junayd with *Bayati Qurdy* tune) through the earphones according to the group division. Then HRR measurements were carried out at 30 seconds, 1 minute, 1 minute 30 seconds, 2 minutes, and 3 minutes after exercise. Measurement results were recorded and analyzed. Univariate and bivariate analysis using independent T-test were carried out using the SPSS for Windows program.

FINDINGS & DISCUSSIONS

The following results represents the background and characteristics of the subjects based on gender, age, exercise frequency, and exercise duration.

Table 1: Baseline characteristics of subjects

Variable	Sex		TOTAL (Σ)
	Female (n=28)	Male (n=28)	
Age* (years)			
Mean ± SD	20,96±1,03	21,04±1,07	21±1,04
Median	21	21	21
Min – maks	19 – 23	19 – 23	19 – 23
Exercise Frequency			
Never exercise	1 (3,6%)	1 (3,6%)	2 (3,6%)
<3x per week	23 (82,1%)	19 (67,9%)	42 (75%)
3x per week	3 (10,7%)	14 (14,3%)	17 (12,5%)
>3x per week	1 (3,6%)	4 (7,1%)	15 (8,9%)
Exercise Duration			
<30 minutes	15 (53,6%)	6 (21,4%)	21 (37,5%)
30-60 minutes	11 (39,3%)	15 (53,6%)	26 (46,4%)
>60 minutes	2 (7,1%)	7 (25%)	9 (16,1%)

Remarks: categorical data the number / frequency is presented with percentages (n and %) while numerical data is presented with mean and standard deviation. If numerical data is not normally distributed, then the data is presented in addition to the median value and minimum and maximum values.

*data is not normally distributed

Table 1 shows that the average age and median age of the subjects was 21 years old with standard deviations of 1.04 years. The youngest and oldest age of the sample is 19 and 23 years old, respectively. This age group belongs to the age group of young adults. This is intended to exclude the confounding factors from age.

According to Dimkpa (2009), age can affect HRR which shows in the younger age group with a median of 25 years old having a lower HRR and experiencing a faster decrease in heart rate compared to the old age group with median of 53 years old (Dimkpa & Ibhazehiebo, 2009).

At the age of 20-30 years, the body reaches the peak of physical fitness, this is caused by two things:

1. Endurance of the heart and blood vessels

Endurance of the heart and blood vessels is increasing starts at the age of children and reaching the maximum in the age 20-30, then will decrease according to age. At the age of 70, an individual only has 50% of heart and blood vessel resistance.

2. Muscle Strength

At the age of 15-19 years the muscle strength has only reached 70-85% maximum. Maximum strength is reached at around 25 years of age. At the age of 65 the strength is only about 65-70% of the strength at the age of 25, then after the age of 65 the decline will be even faster.

It is known that all physical fitness component values will also decrease after approximately 30 years of age, due to a decrease in functional capacity and of all body cells / organs by 1% per year or an estimated 8-10% per decade, but this decrease can be reduced up to half with regular exercise (Arif Rahmat, Akbar Ieva, 2015; Susilowati, 2007).

Recovery of the heart rate is normal if there is a decrease of > 12 beats in the first 1 minute immediately after exercise (Phan et al., 2010). The results of the study on post exercise HRR responses are as follows.

Table 2: HRR response following Exercise towards Intervention

HRR response following exercise	Classical Music	Qur'an Recitation	Total	P value
Normal	21 (45,6%)	25 (54,4%)	46 (82,5%)	0,162821
Abnormal	7 (70%)	3 (30%)	10 (17,8%)	

Post exercise HRR response by calculating HRR difference immediately after exercise and first minute. As a result of the 56 study subjects, 82.5% had normal HRR, 54.4% from the Qur'an recitation group and 45.6% from the classical music group. While 17.8% of respondents have abnormal HRR response, 30% from the Qur'an recitation group and 70% from the classical music group. Statistically there were no significant differences in the results of chi square test with $p > 0.05$. However, it can be seen from these results that there is a trend of a significant decrease in heart rate in the Qur'an recitation group compared to classical music group.

The results of the analysis of the post exercise HRR response to the intervention in this study are in accordance with the research conducted by Ajorpaz (2011), where the Qur'an is proven to reduce anxiety ($p = 0.001$), pulse ($p < 0.02$) and blood pressure ($p < 0.004$) (Mirbagher Ajorpaz et al., 2011).

Listening to the verses of Qur'an causes changes in electrical currents in muscles, blood circulation, heart rate and blood levels. These changes indicate a relaxation or a decrease in reflective nerve tension resulting in the release of arteries accompanied by a decrease in heart rate (Faradisi, 2009).

After the HRR normality test, the results show that the HRR distribution which is calculated continuously is normally distributed because p value in each group are > 0.05 . Furthermore, an independent T-test was conducted to see whether there were HRR differences in the two interventions.

Table 3: Relationship analysis between HRR and intervention

	Intervention (Mean±SD)		P value
	Classical music (n=28) (beat/minute)	Qur'an recitation (n=28) (beat/minute)	
HRR immediately after exercise	144,96±19,22	144,64±23,77	0,95
HRR 30"	132,11±17,27	132,57±19,09	0,92
HRR 1'	119,93±17,22	119,32±17,11	0,89
HRR 1.5'	111,82±14,95	112,36±17,26	0,90
HRR 2'	108,61±15,96	108,11±17,34	0,91

Table 3 shows the relationship between types of interventions for HRR at various times. It can be seen that HRR mean and standard deviation using classical music and Qur'an recitation are not much different from $p \text{ value} \geq 0.05$ which means there is no difference in listening to Qur'an recitation and classical music on HRR following a HST or it can be concluded that Qur'an recitation has the same effectiveness with classical music intervention on HRR following a HST.

This result can be caused by the two interventions namely classical music and Qur'an recitation are sedative music (Palit & Aysia, 2015). Sedative music or relaxation music is generally characterized by slow and soft music with little rhythmic activity. Listening to relaxing music in silence can significantly reduce tension and anxiety compared to respondents who listen to sound or stimulative music (Jiang, Zhou, Rickson, & Jiang, 2013). Physiologically in the body, relaxing music can stimulate the axons of ascending nerve fibers to the neurons and then transmitted to the cerebral cortex, limbic system, and the *corpus callosum* through the autonomic nerve area and the neuroendocrine system (Setiawan, Susilaningsih, & Emiliawati, 2013).

Music preference, regardless of the type of music, can reduce tension subjectively. Physiological responses (heart rate, respiration, and blood pressure) are greater when measured while listening to stimulative music compared to quiet music. However, musical preferences do not affect physiological responses (Iwanaga & Moroki, 1999).

However, other studies stated that music preference is considered an important factor in the potential of the music because it relates to mood. Recent research shows that listening to preferred music can reduce anxiety and reduce emotional stress. Respondents who listened to preferred music showed significant relaxation results compared to respondents who listened to unwanted music. Conclusions from Jiang (2013) that there is a positive correlation between music preferences and relaxation effects.

Musical preferences can influence how the music effects the respondents (Palit & Aysia, 2015). Listening to certain types of music can influence one's musical preferences so that they affect emotional responses and the pulse rate of respondents (Iwanaga, Kobayashi, & Kawasaki, 2005).

In addition, the interventions used Qur'an recitation and classical music are allegedly different types of music, namely instrumental music and vocal music. Instrumental music, which the most important effect comes from the tone, type and melody of instrumental sounds. Whereas vocal music, apart from background music, lyrics and language, it is suspected to have a distinctive effect on the body, because the thoughts and feelings conveyed are contained in the music.

However, this cannot be applied in this study because the respondents did not understand the chant of the The Al-Mulk. The study said that the pulse rate of respondents who listened to instrumental music and vocal music showed comparable results, but differed when compared to the control group (Savitha, Sejil, Rao, Roshan, & Avadhany, 2013).

Graphic 1: Analysis of Gender Relationship to HRR

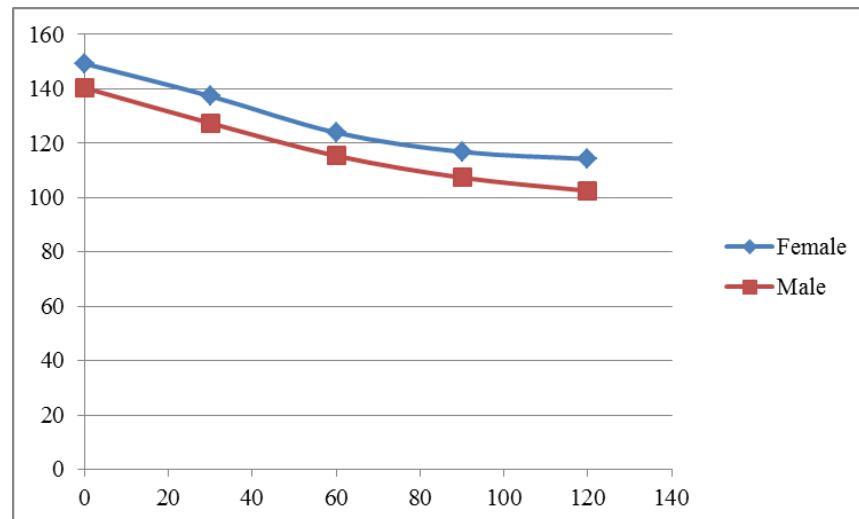


Table 4: Analysis of Gender Relationship to HRR

	Sex (Mean±SD)		P value
	Female (n=28) (beat/minute)	Male (n=28) (beat/minute)	
HRR immediately after exercise	149,25±23,93	140,36±17,91	0,121
HRR 30"	137,32±18,52	127,36±16,38	0,038*
HRR 1'	123,89±17,21	115,36±15,99	0,060
HRR 1.5'	116.82±15,66	107,36±15,16	0,026*
HRR 2'	114,2±15,36	102,5±15,77	0,007*

*P value is significant

Graphic 1 shows HRR changes over time seen from the sex of the research subjects. It can be seen that the average reduction in HRR in the sexes of male and female is different from the difference of 5 - 12 beats / minute. But both of them have the same tendency, the longer the time after the activity is carried out, the HRR will go down. To ascertain whether the HRR mean difference in male and female sex was different, a T-independent test was conducted. The results of this test showed that in HRR 30", HRR 1.5' and HRR 2', the sex influenced the average decrease in HRR because the p value of both HRR measurement times was less than 0.05 (respectively 0.038, 0.026 and 0.007), clinically male respondents showed a faster decline in heart rate compared to female respondents.

The results of the research on the relationship of sex to HRR in this study are in accordance with the research conducted by Sandi (2016), where men have HRR whose decline is faster than women.

Men can produce more energy than women, this is because men have more muscle mass and fewer body fat compositions than women. Women have less testosterone than men, which will affect the hormone erythropoietin to produce more red blood cells. This is evidenced by the higher hemoglobin level in men compared to women around 10% to 14% (Valendra, 2015).

Thus, men have higher aerobic abilities compared to women. Women's aerobic ability is around 20% lower when compared to men of the same age range (Susilowati, 2007).

If the respondent understands Arabic, the selection of surah must be considered. A more significant response is expected.

CONCLUSIONS

There is no difference effects in listening to Qur'an recitation and classical music on the pace of relaxation based on the measurement of HRR following a HST. However, there are more normal HRR response trends in the Qur'an recitation group compared to classical music group.

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