

# Effect of Listening to the Al-Quran on Heart Sound

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**Abstract.** This paper investigates the effect on the heart sounds upon listening to the chosen verses of the Al Quran. A signal of the heart sounds is extracted using Thinklabs Phonocardiography software and then the frequency components are extracted using MATLAB 7.11.0. Frequency components during diastolic are compared for two sessions; before and during listening sessions. Diastolic is a period where the chamber of the heart is filled with the blood when the heart muscle is in a relaxed condition. From this study, it is found that the frequency of the heart sound during listening to Al-Quran is lower than the one before listening to Al-Quran. This indicates that, the state of calmness can be achieved by listening to this selected verses of the Al-Quran.

## 1. Introduction

Scientific studies have shown that listening or reciting Quranic verses have many benefits and is essential for psychological health [1,-3,7, 11,12] and under certain circumstances supersedes listening to classical music [2]. Study by Zulkurnaini [2] showed that, listening to Al-Quran can give more relaxation effects as compared to listening classical music where they demonstrated that 12.67% improvement in alpha band before and after listening to the Quran while only 9.96% improvement in study of classical music. Another research stated that by reading, listening and watching the text of Quran can reduce stress and tension of our life and also can achieved mental, spiritual and physical relaxation [3]. Furthermore, a study by Siti Awa Abu Bakar [1] reported that 30 minute of the Quran recitation for mechanically ventilated patients in ICU promotes the psycho-spiritual comfort and reduce the patients' heart rate. Zulkurnaini [2] also reported that if human brain is exposed to one of the verses in the Quran resulted in the increasing in the alpha band than listening to classical music. Thus improve the relaxation and alert condition. These are among the scientific studies done to show that listening and reciting Quran can give benefits to human; Muslims or non-muslims..

The degree of one's health can be measured through several parameters. Among them are from EEG signals which give information on the state of the brain through the measurement of the alpha band, ECG will give information on the heart rate and so on so forth. By knowing this information, the state of one's health condition can be determined. In this study, the information on the diastolic measurements from the heart sound analysis will be used as the parameter to determine the correlation between the relaxation and health of a person due to listening to the selected verses of the Quran.

Diastolic measurements are normally used by the physician to determine the relationship between high diastolic pressure and heart failure. High diastolic pressure can cause the heart muscle to stiffen [4]. Diastole is the time when the heart muscle is in a relaxed condition and it occurs in S2 and the S1.



## 2. Heart Sounds

The heart sounds contain the two normal sounds which is the first heart sound (S1) and the second heart sound (S2) which are referred as 'lub dub' sounds. Besides, third (S3) and fourth heart sound (S4) can also exist under certain pathological conditions [5]. These rhythmic set of S3 and S4 are often called gallops which are associated with diastolic filling and low frequency sounds.

Cardiac cycle is the chronological succession of electrical and mechanical issues that pass during the heart in a single round namely referred as diastole and systole. Diastole attributes to the part of relaxation where the ventricles are relaxed and blood comes into them from the atria while during the ventricles is contracting is the point of systole [6]. Systole on contrary is assigned to the contraction. Figure 1 shows the occurrence of diastole and diastole in the heart sound signal.

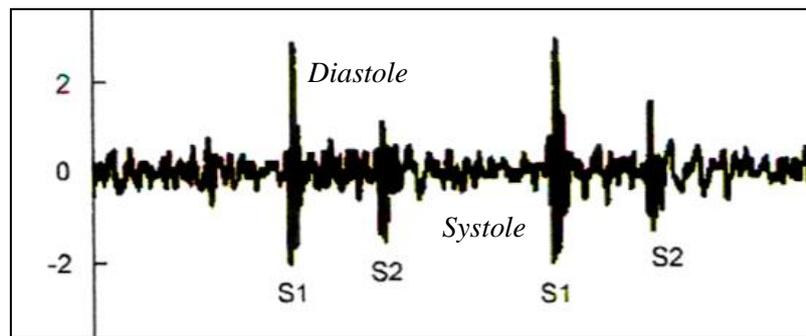


Figure 1: Representative heart sound

## 3. Methodology

Heart sounds from selected group of samples are recorded using simple circuit connecting the stethoscope to the laptop. Thinklabs Phonocardiography software powered by Audacity is used to record the heart sound. The comparison of the analysis of the diastole's frequency of the heart sound between before and after was made. The verse of the Quran played to the subjects is Al-Hasyr verses 18-24. Total duration of data taken is for 3 minutes. Each minute of the data taken is allocated for before, during and after listening to this verse of the Quran. The process flow on recording the heart sound is shown in Figure 2

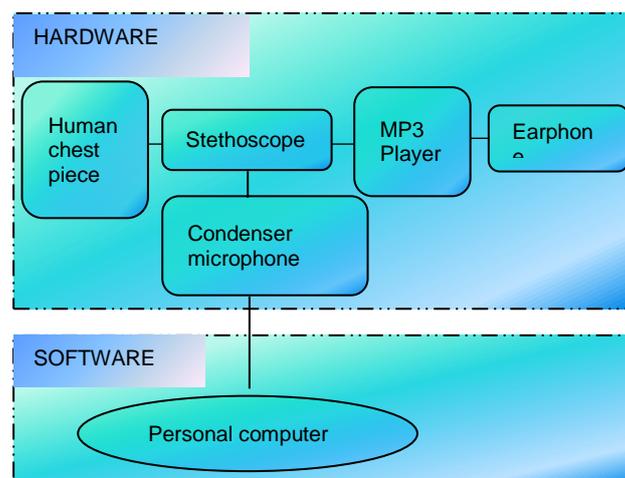


Figure 2: Flowchart of heart sound recording

The sentences of the Quran exposed to the subjects are chosen due to the contents it conveys. Since it is about the faith (imaan) of the muslims, we would like to see the effects of these verses to the

listeners. Regarding the faith of the muslims, they are required to follow all commands from Allah and the ones taught by the Prophet Muhammad (Peace be upon him).

#### 4. Fast Fourier Transform (FFT)

In determining the frequency contents of the heart sounds, the fundamental method; the Fourier transform is used. It gives the information on the frequency components that existed in the signal analysed. The Fourier transform relates the continuous-time representation  $x(t)$  to the continuous-frequency representation  $X(f)$ . For processing on digital computers, it is necessary to have a similar transform that relates the discrete-time representation  $x(n)$  to the discrete-frequency representation  $X(k)$ . The resulting transformation is known as the discrete Fourier transform (DFT). The Fast Fourier transform (FFT) on the other hand is essentially the high speed implementation of the DFT of a given signal. It transforms the signal in time or space into discrete frequency domain.

The FFT is given by;

$$X(k) = \sum_{n=0}^{N-1} x(n) e^{-j2\pi kn/N} \quad 0 \leq k \leq N-1$$

= 0; elsewhere

Where  $k$  is the discrete frequency,  $n$  is the sample in time and  $N$  is the total number of samples.

#### 5. Results and Discussions

Figure 3 illustrates the sample of the heart sound recorded using Thinklabs Phonocardiography software. This data is processed and then the frequency components of the heart sounds during diastolic are determined. Fast Fourier Transform from Matlab mathematical software is used for this purpose. The sampling frequency of audio used is 44.1 kHz and the duration of recording data is around 7-12seconds. The volunteer is asked to lie down as of to make their body static and minimize the movement and hence the interference during recordings. The heart sound's data is recorded from the pulmonary position of the human chest for three conditions; before during and after listening to the recitations of the Quran. The diastolic frequencies of the samples are recorded and analysed.

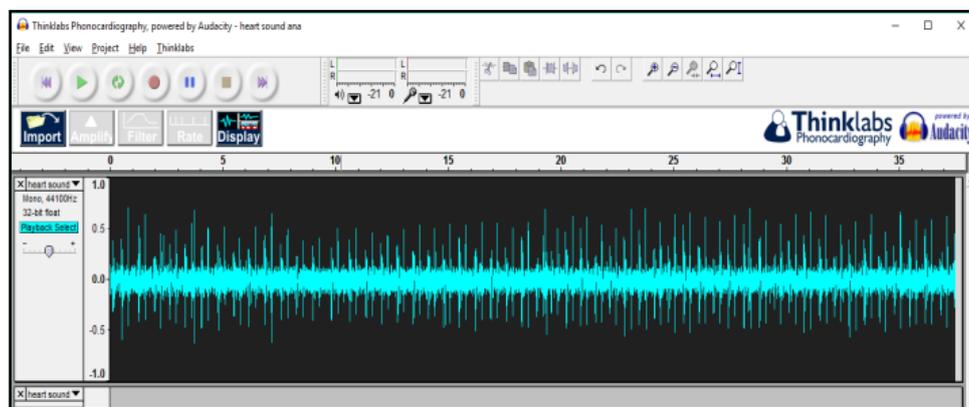


Figure 3: Screenshot one of recorded data of heart sound signal

Figure 4 shows the display representation of the heart sound (in both time and frequency domain) before listening to the Quran while Figure 5 shows these representations after listening to the recitations.

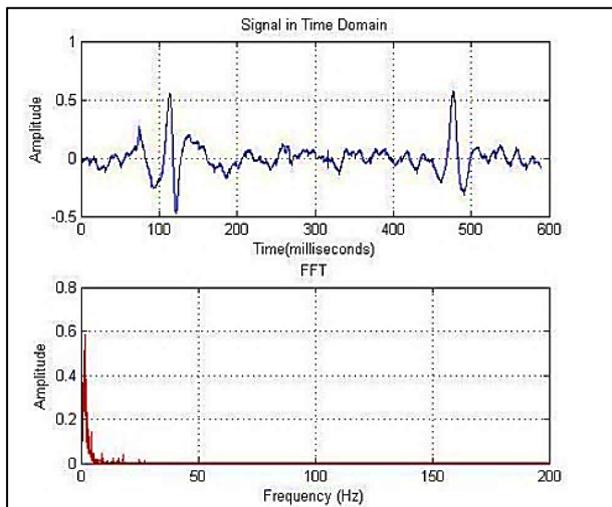


Figure 4: Sample of the heart sound before listening to Al-Quran

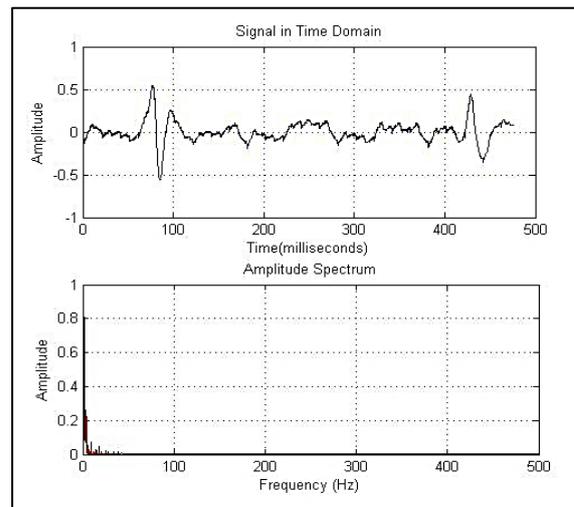


Figure 5: Time and frequency domain during listening to Al-Quran

Based on the analysis of the heart sounds for 20 volunteers, it is found that the frequency of the heart sound between S2 and S1 or diastolic frequency is in the range of 60Hz to 80Hz. During listening to Al-Quran, their respective frequency shows a decrease in number as shown in Figure 6. It indicates that the lower the frequency, the higher the level of relaxation. Thus, it is found that the frequency of the diastolic heart sound during listening to Al-Quran is lower than the frequency of before listening to Al-Quran. Meaning that, the state of calmness or relaxation can be accomplished by listening to Al-Quran. On average, the frequency of the heart sound has decrease by 8.6%. That indicates a significant decrease which leads to relaxation and calmness

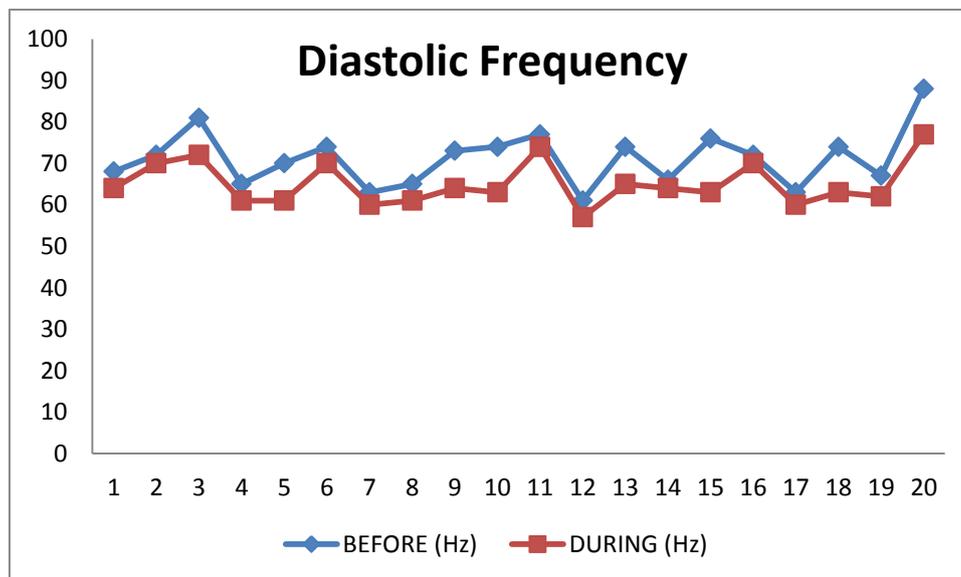


Figure 6: Diastolic frequency before and during listening to Al-Quran.

## 6. Conclusions

In conclusion, it is found out that by listening to Surah Al Hasyr, the state of calmness can be achieved. The frequency obtained between S2 and S1 frequency is found to be lower during listening to Al-Quran compared to the frequency before listening to Al-Quran. Lower frequency indicates a state of relaxation. Furthermore, improvements can be made on the procedure of taking the data by properly handling the stethoscope and the position of the volunteer so as there is no external factors affecting the data collections.

## 7. References

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