

CHAPTER 5

RESULT AND DISCUSSION

In this chapter, the result of the research is discussed. The contents of this chapter is the analysis of Semimembranosus muscle from EMG signal and blood pressure and analysis of T test.

5.1 Semimembranosus Muscle Contraction Analysis

The experiment is performed in 2 conditions. A condition of on-machine and on-machine condition. on-machine condition has the vibration that transmitted from the machine as it is operated. The vibration of the motorcycle during the experiment is 0,06 m/s². It is the minimum value of the vibration as it is excluded the dynamic vibration from the machine usage during riding. During on-machine and off-machine condition, the EMG signal graph is increasing through the time. In this research, the study uses mean of root mean square (mRMS) of each respondent's muscle contraction signal. The mRMS method is the best method suggested as the mRMS value would not be changed by the time and less affected of the signal noise (Renshaw et al., 2010). To get mRMS value, the signal should be known as the RMS value. To know the RMS value, digital filtering of EMG with decay parameter is needed. Each respondent's mRMS is tested using T test.

The first comparison is by comparing mRMS of each respondents during on-machine and off-machine condition which refers to the difference between male and female respondent. Based on Figure 4.1, it is shown that between male and female respondents, the mRMS value of the male respondent is higher in both on-machine and off-machine conditions. The independent T test result to this comparison is shown in

Table 4.4 for the on-machine condition experiment and Table 4.5 for the off-machine condition experiment. Male and female respondents during on-machine condition have significance value of 0,014. It p-value is less than 50 % or 0,05 that means H1 is accepted. H1 means that both data have significant differences. It is mean that between male and female respondent during on-machine condition has different muscle contraction. Male and female respondents during off-machine condition have significance value of 0,000018. It p-value is less than 50 % or 0,05 that means H1 is accepted. H1 means that both data have significant differences. It is mean that between male and female respondent during off-machine condition has different muscle contraction. Both conditions of on-machine and off-machine condition have different muscle contraction which is male respondents tend to have higher amplitude during on-machine condition and also during off-machine condition than female respondent. In some researches conducted by Ahamed et al., (2015) and Cioni, et. al., (1988) done the experiment of male and female respondent and having the result that male respondent has higher muscle contraction as male muscle signal generated as higher and steadier muscle than female muscle contraction. Male skeletal muscles are generally faster and have higher maximum power output than female muscles. While, during repeated contractions, female muscles are generally more fatigue resistant and recover faster especially for children (Glenmark, 2004)

The comparison of mRMS on each respondent during on-machine and off-machine condition which refers to the difference between mRMS of male respondent during on-machine and off-machine condition and female respondent during on-machine and off-machine condition. Based on Figure 4.1, it is shown that between male and female respondents, the mRMS value of the on-machine condition is higher than off-machine condition. Both of them have different and higher amplitude in on-machine condition. The on-machine condition has vibration that refers to fatigue (NIOSH, 1997). The higher of on-machine condition indicates the increasing of amplitudes which leads to fatigue (Halim et al., 2012). The paired T test result to this comparison is shown in Table 4.6 for the male respondent's experiment and Table 4.7 for the female respondent's experiment. The difference of male respondents during on-machine and off-machine condition have significance value of 0,028. It p-value is less than 50 % or 0,05 that means H1 is accepted. H1 means that both data have significant differences. It

is mean that male respondents has different muscle contraction between during on-machine and off-machine condition. The difference of female respondents during on-machine and off-machine condition have significance value of 0,000012. It p-value is less than 50 % or 0,05 that means H1 is accepted. H1 means that both data have significant differences. It is mean that female respondents has different muscle contraction between during on-machine and off-machine condition. Both conditions of male and female respondent have different muscle contraction during on-machine and off-machine condition which is both male and female respondents have the inclination of higher amplitude value in on-machine condition than during the off-machine condition experiment. It has been indicated that repeated and prolonged exposure to vibration and can lead to serious back problems (Nakashima, 2004).

5.2 Blood Pressure Analysis

The blood pressure measurement is conducted before and after the experiment to identify the changes that affected by the experiment. The comparison of mean systolic and diastolic of each respondents that shown on Table 4.3 served in histograms. Those histograms are used to know the difference of systolic and diastolic blood pressure between before and after experiment in the on-machine and off-machine condition and systolic and diastolic blood pressure between on-machine and off-machine condition before and after experiment.

The difference of systolic blood pressure between before and after experiment in on-machine and off-machine condition are shown in the Figure 4.6 and Figure 4.7. In Figure 4.6, it is shown that between male and female respondent, their systolic blood pressure is decreased in the on-machine condition. Systolic blood pressure value of male respondent before the experiment is higher than female respondent. Systolic blood pressure value of male respondent after the experiment is the same with female respondent's systolic blood pressure. Figure 4.7 shows that between male and female respondent, their systolic blood pressure is decreased in the off-machine condition. Systolic blood pressure value of male respondent before the experiment is higher than female respondent. Systolic blood pressure value of female respondent after the experiment is higher than male respondent.

The difference of diastolic blood pressure between before and after experiment in the on-machine and off-machine condition is shown in the Figure 4.8 and Figure 4.9. In Figure 4.8 shown that between male and female respondent, their diastolic blood pressure is decreased in on-machine condition. Diastolic blood pressure value of male respondent before the experiment is higher than female respondent. Diastolic blood pressure value of male respondent after the experiment is higher than female respondent. Figure 4.9 shows that between male and female respondent, their diastolic blood pressure is decreased in off-machine condition. Diastolic blood pressure value of male respondent before the experiment is higher than female respondent. Diastolic blood pressure value of male respondent after the experiment is having same value with female respondent systolic blood pressure

The difference of systolic and diastolic blood pressure between on-machine and off-machine condition before experiment is shown in the Figure 4.10 and Figure 4.11. Figure 4.10 shows the systolic blood pressure between on-machine and off-machine condition before experiment. From this figure, it is shown that even the mean systolic blood pressure is different, the difference is not related to the experiment. the systolic value is taken when the respondent in health and relax condition with no fatigue. This figure also shown that male respondent has higher systolic blood pressure than female respondent even they are not in fatigue. Figure 4.11 shows the diastolic blood pressure between on-machine and off-machine condition before experiment. From this figure, it is shown that even the mean diastolic blood pressure is different, the difference is not related to the experiment. the systolic value is taken when the respondent in health and relax condition with no fatigue. This figure also shows that male respondent has higher systolic blood pressure than female respondent even they are not in fatigue.

The difference of systolic and diastolic blood pressure between on-machine and off-machine condition after experiment shown in Figure 4.12 and Figure 4.13. Figure 4.12 shown the systolic blood pressure between on-machine and off-machine condition after experiment. The figure shown that the mean systolic blood pressure after the experiment of female respondent between on-machine is lower than off-machine condition was affected much during on-machine condition. The figure shown that the

mean systolic blood pressure after the experiment of male respondent between on-machine is higher than off-machine condition was affected much during on-machine condition. Figure 4.13 shown the diastolic blood pressure between on-machine and off-machine condition after experiment. The figure shown that the mean diastolic blood pressure after the experiment of female respondent between on-machine is lower than off-machine condition was affected much during on-machine condition. The figure shown that the mean diastolic blood pressure after the experiment of male respondent between on-machine is higher than off-machine condition was affected much during on-machine condition.

After the experiment, Systolic blood pressure in the on condition and off condition shows the decreasing. It is caused by the occluded blood flow during the uncomfot sitting. The edge of the seat is pressed through the force from the hang leg as children's leg can has not enough leg length. The prolonged uncomfot sitting causes muscle contraction blood pressures decreased due to prolonged lower body immobilization, which causes poor systematic circulation (Balasubramanian, et. al., 2014) This condition will produce the inner-thigh pressure which occluded blood supply then it it leads to transient paresthesia (Alhoseini, et. al., 2012). As the blood flow occluded, the blood supply to the muscular tissue will be blocked as it will also decrease their energy. Hence, it will be dangerous to face prolonged exposure of vibration will cause several disease such as high blood pressure (Shivakumara BS. and Sridhar V., 2010). It would give defect in normal blood flow can have a significant impact on a children's physical, mental development and low working memory from growth to behavioral and academic performance (Evans, 2006).