The purpose of this research is to develop a scientific method to monitor bowling actions and measure fatigue in order to reliably predict likelihood of injuries to a bowler. Due to the frequent injuries to our bowlers and rapid advances in using technology for sports kinematics, measurement of fatigue needs to be dealt with scientifically on modern lines by experts. Through this novel research, a scientific model and lab experiment which utilizes electromyography to study muscle movements and their corresponding signals is developed. This model shows the muscle's contraction and relaxation at every step of the bowling process. Such type of representation of data can help us monitor fatigue by noting the median frequency of EMG plot in the frequency domain. Thus using analog signal processing and plotting in MATLAB software, we can compare graphs for each trial and note the shift in muscle fatigue index (median frequency) towards lower values as fatigue develops. This hypothesis that lowering of muscle fatigue index is a measure of fatigue, as drawn from literature, was also validated by the experiments. This cutting edge research can be a major resource in equipping the academia with necessary groundwork to improve upon the model in terms of accuracy and efficiency in the future in order to make it a full scale industrial level project. In a nutshell, this thesis explains the design objectives, challenges, choices, testing environment for the lab experiment, and also provides a context for future research which can be performed utilizing this basic model for studying muscle signals and corresponding fatigue.