J. Phys. Ther. Sci.
25: 211–214, 2013

Assessment of Heart Rates and Blood Pressure in Different *Salat* Positions

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Abstract. [Purpose] This study reports the effects of the Muslim prayer, known as *Salat*, on heart rate (HR) and blood pressure (BP) while performing and miming the actions of *Salat*: standing, bowing, prostrating and sitting. [Subjects] Thirty Muslim subjects were asked to perform the actual and mime *Salat*. [Methods] HR and BP were measured using a Schiller AT-102 Electrocardiograph and an Omron SEM-1 Automatic Blood Pressure Monitor. [Results] The findings revealed that there was a significant difference in the HR of the subjects between performing and miming *Salat*. The standing and prostration positions of *Salat* produced the highest and the lowest HR, respectively. A lower HR may be of potential benefit to an individual's health. The systolic and the diastolic BP decreased significantly after performance and mime of *Salat*, and a greater reduction in BP was observed during performance of *Salat*. [Conclusion] This is the first study of HR and BP in relation to *Salat* positions. The findings will encourage further studies to explore the benefits of *Salat* maneuvers for patients with cardiovascular diseases.
Key words: *Salat* positions, Blood pressure, Heart rate

(This article was submitted Sep. 14, 2012, and was accepted Oct. 19, 2012)

INTRODUCTION

Salat is a Muslim prayer, it is a form of meditation[1)], and it is obligatory in Islam to pray and to show one's respect and worship the Almighty. It is a religious activity that involves recitations and specific positions: standing (*qiyam*), bowing (*rukuk*), prostration (*sujud*), and sitting (*tahiyyat*). Muslims are required to perform *Salat* five times daily in addition to voluntary prayers (*Sunnah, Nafla*) *Salat* begins with the *takbir*, raising one's hands to face level, and ends with the *salam*, turning the head to the right then to the left shoulder[2)].

Salat serves many purposes. For example, it teaches the Muslims how to discipline themselves, by practicing good time management, and complying with the assigned time for the prayers.

Meditation is known to influence physiological parameters such as heart rate[3)], blood pressure and respiration rate[4)]. Therefore meditation can be used as a therapy for patients who have heart problems such as hypertension or problems with their musculoskeletal system[5)].

Heart rate (HR) is an indicator of cardiac function and a parameter of the heart's performance. It can be observed non-invasively using an ECG (electrocardiogram). HR is the number of heartbeats per unit of time, typically expressed as beats per minute (bpm). It is the response of the heart to the demands of the body in many situations and positions[6)].

HR changes due to many factors such as biological and physiological responses (sympathetic, parasympathetic and endocrine)[6–8)], physical activities (exercises), behavioral and psychosocial factors[9)], environment (temperature and altitude)[6)], body positions and postures[10)], and others (medication, drugs, chemical substances and diseases). All the factors that are mentioned above also affect blood pressure[11)].

Blood pressure (BP) is one of the important physiological parameters to be considered in assessing a patients' health status. BP is the force of the blood pushing against the walls of the blood vessels as blood flows through the body. This pressure is generated by the heart pumping blood around the body and by the resistance of the arteries to the flow of blood[12)]. Studies have provided strong evidence that meditation may help decrease BP of the persons who are moderately hypertensive[13–15)]. Many studies have also revealed that this positive effect disappears when meditation is discontinued[16, 17)].

There are many studies that describe the correlation between meditation and its body positions or physical activities and their effects on HR, BP, and other hemodynamic parameters[10, 18–22)]. For example[23)], a previous study compared three styles of yoga *asana* practice: the yoga posture, breathing exercises, and relaxation or resting posture. Some studies have reported that the heart rate decreases during meditation and while performing other