

Research Article

Cardiovascular Response to Head Down Crooked Kneeling Position Among Type 2 Diabetic Patient

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Abstract

Background: Factors like emotions, lifestyle choices, and physical activities, including posture changes, have a significant impact on cardiovascular indicators like blood pressure and heart rate. The study aims to examine the cardiovascular reactions in individuals with type 2 diabetes while performing the head-down crooked kneeling (HDCK) or Sujood position, resembling poses found in hatha yoga. This position emphasizes relaxation, body awareness, and meditation. Those with type 2 diabetes who engage in yoga have reported enhancements in their management of blood sugar levels and insulin resistance.

Methodology: A cross-sectional study was conducted in different hospitals. The sample size was 312 which was calculated by using the Rao soft calculator. The participants were selected by non-probability convenience sampling technique. Inclusion Criteria were male and Female diagnosed with Type 2 DM, Subjects with a history of smoking, Cognitive Impairment, Sepsis, Cardiac pathology, Respiratory disorders, and Malignancy were excluded. Blood pressure and heart rate were monitored initially, during the Crooked Down Kneeling position, and after the Crooked Down Kneeling Position. A Digital Sphygmomanometer was used to measure blood pressure and a pulse rate-demographic Assessment form was used to collect data. Ethical consideration is maintained. Informed consent was taken from participants.

Results: The result shows a significant effect of head down crooked kneeling position on cardiovascular response in type 2 diabetic patients ($p < .001$). Systolic, diastolic blood pressure, and heart rate before, during, and after HDCK were significantly increased ($p < .001$) as compared to the baseline value, and after 5 min returning to the upright position it reverted to the initial value.

Conclusion: This study revealed a significant increase in systolic and diastolic blood pressures and an increase in pulse rate during HDCK. Also, our findings showed no significant gender difference in the effect of HDCK on all the other cardiovascular parameters except systolic bp.

Introduction

The cardiovascular system is comprised of the heart, and blood constituents that transport and give nutrition and oxygen to all body tissues as needed for the metabolic system. Nearly all bodily systems undergo physiological changes as a result of exercise, but the cardiovascular and muscular systems are particularly affected. Everything that occurs during exercise has an impact on the body [1]. Salah is a prayer practiced by Muslims and can be considered a form of slow moderate exercise Sajdah", a prostration position, is part of Muslim daily prayers. It seems to have several effects on the brain and heart function [2]. In the Sajdah position the head is lower than the heart, which increases blood flow to the brain and also increases the feeling of calm and relaxation [3].

Yoga and 'Salaah' are related since they revitalize the body

and mind's internal mechanisms. People with type 2 diabetes who practice yoga see improvements in their glycaemic management and insulin resistance. This art and science help to promote health, and well-being and thus can increase the life cycle Yoga encourages mindfulness, which can be wont to help promote mindful eating and healthy eating habits. This practice has been shown to market healthy eating habits that help control blood glucose, increase weight loss, and treat disordered eating behavior [4]. Diabetes Mellitus is a chronic metabolic disorder that involves abnormal blood glucose levels that lead to both macrovascular and microvascular alterations [5]. Concurrently, hyperglycemia contributes toward the development of atherosclerosis and arterial stiffness. Chronic damage to the endothelium and the effects of inflammatory cytokines on the endothelium play important roles in the genesis and stability of the plaque [6].

More Information

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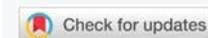
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Keywords: Cardiovascular system; Head down crooked kneeling position; Diabetic patient



Many factors influence an individual blood pressure measurement. It is observed that slight changes in the position of systolic and diastolic blood pressure either increase or decrease. If a patient obtains sitting, supine, or even a cross-leg position it varies. Over time, diabetes damages the small blood vessels, causing the walls of the blood vessels to stiffen and function improperly. The aim of this study was to assess cardiovascular response to Head down Crooked Kneeling Position in Type 2 Diabetes Mellitus. By measuring Heart Rate and Blood Pressure. This research will anticipate the clinical effectiveness of HDCK and its effects on cardiovascular variables among Type 2 diabetic patients.

Methodology

Study design

The study design was Analytical and cross-sectional. This study design was used to identify the influential characteristics of the target population at a certain point in time. Cross-sectional research design is observational in nature and it just records the information and association related to a particular subject in a given population that was not affected by variables.

Sample population

The sample size was 312 which was calculated by using Rao soft calculator. The sample size used in previous research was 163 [7]. This is then multiplied by 10 and results in 1630 by using the Rao soft calculator. Males and females diagnosed with T2DM Middle adulthood aged 30-50 years were included.

Data collection

Data has been collected from different hospitals and special institutes in Lahore. Data was collected manually with digital apparatus and with the help of Demographic Questionnaires. The sample size was 312 Sampling technique was Non-Probability Convenience Sampling. Subjects with a history of smoking, Cognitive Impairment, Sepsis, Cardiac pathology, Respiratory disorders, and Malignancy were excluded. Study was conducted after the Approval was taken from IRB (Institutional Review Boards of University of South Asia, Lahore), with approval number 143. Ethical consideration has been maintained. Informed consent was taken from participants. We described the topic regarding data and also explained the purpose of the study to subjects. Blood pressure and heart rate were monitored initially, then into the crooked down kneeling position, and after the crooked down kneeling position. On the basis of inclusion and exclusion the data collected from diabetic patients.

Instruments

Digital Sphygmomanometer was used to measure blood pressure and pulse rate. A demographic Assessment form was used to collect data.

Statistical analysis

The IBM statistical package for social science was used to conduct the analysis (SPSS V22). For quantitative data mean and standard deviation were calculated. For qualitative data frequency and percentage were calculated for the analysis. Inferential statistics include ANOVA, one-way ANOVA implies a linear model in which a continuous variable (cardiovascular response) is predicted from one categorical variable (male and female). Independent sample t-test is used to compare two sample means from unrelated groups.

Results

The research included 312 participants of which 57% were female and 42% were male the participants who fulfilled the inclusion criteria were chosen. Data was entered in SPSSV22 for statistical analysis. Descriptive statistics illustrating the study variable show the mean age of male participants was 43.83 ± 6.127 years. And mean age of female participants 42.32 ± 5.406 was years. Histogram shows the frequency of ages in a sample of 312 people, with ages ranging from 30 to 50 with the maximum frequency being 25 Table 1.

Frequency bar chart of gender shows 178(57%) female and 134(42%) $n = 312$ type 2 Diabetic patients. The psychosocial variable suggests that only a small 3% proportion of participants were a smoker in the study cardiac pathology in the sample was 0.3%, suggesting that only a small proportion of participants reported a cardiac condition Respiratory disorders in the sample suggested that no participants reported having the respiratory condition.

The statistical analysis revealed a significant effect of head down crooked kneeling position on cardiovascular response in type 2 diabetic patients ($p < .001$). The effect of HDCK position on the cardiovascular response of the participants shows a significant difference ($p < .001$) in systolic blood pressure. The mean SBP before HDCK was (126.0 ± 12.84) mmHg, the mean SBP during HDCK was (132.3 ± 12.37) mmHg, and after HDCK the mean SBP was (127.2 ± 9.94) mmHg. Diastolic blood

Table 1: One-way ANOVA for differences in cardiovascular responses by gender distribution.

Cardiovascular responses and difference by Gender before, during and after HDCK position			
Gender			
Variable	Male mean (SD)	Female mean (SD)	p - value
HR			
Before	84.52 ± 10.4	83.61 ± 10.3	.440
During	87.66 ± 10.40	85.40 ± 10.7	.064
After	85.02 ± 9.83	84.20 ± 0.03	.475
SBP (mmHg)			
Before	126.97 ± 12.48	125.26 ± 13.10	.244
During	134.38 ± 12.92	130.80 ± 1.74	.011
After	127.59 ± 8.90	127.02 ± 12.5	.653
DBP (mmHg)			
Before	81.45 ± 9.32	81.14 ± 10.3	.786
During	85.14 ± 9.60	84.47 ± 9.32	.536
After	82.79 ± 9.05	82.80 ± 8.2	.985



pressure was significantly increased ($p < .001$) during the HDCK position the mean DBP was (84.75 ± 9.43) mmHg from the baseline value (81.27 ± 9.93) and after 5 min returning to an upright position the mean DBP was (82.80 ± 8.55) mmHg. HR significantly increased to HDCK (86.37 ± 10.66) from the baseline value (84.00 ± 10.37) and then reverted to the initial value after 5 min of upright position (84.55 ± 9.94) mmHg. Also, our findings showed no significant gender difference in the effect of HDCK on cardiovascular parameters except only in systolic blood pressure during HDCK position significant difference was found ($p.011$).

Discussion

The aim of this study was to investigate cardiovascular response in head down crooked kneeling position among Type 2 diabetic patients. We hypothesize that there will be either an increase or decrease during HDCK Position. The results of this study indicate that the head down crooked kneeling position has a significant effect on cardiovascular response in type 2 diabetic patients and no significant gender difference was found except the systolic variable during HDCK. A total of 312 participants were included in this study. The main finding was that systolic, diastolic, and heart rates were significantly increased in both male and female participants during Sujood, in comparison with the value before and after obtaining the HDCK position Table 2.

This finding is consistent with the previous study. The aim of the study was to evaluate the subjective, cardiovascular, and traction effects of inversion using noninvasive techniques. The result shows that the Heart rate decreased and blood pressure increased an average of 20 mm Hg for both systems as subjects were inverted [8]. In the current study blood pressure increased an average of 10 mm Hg in both male and female participants during the head-down crooked kneeling position.

Previous studies on Heart rate, heart rate variability, and beat-to-beat blood pressure were measured in young, healthy non-smokers, during prone, supine, and sitting postures (Prone versus supine) blood pressure and heart rate were significantly higher in the prone posture. (Prone versus sitting) blood pressure was higher and heart rate was lower

in the prone posture and significant differences were found in some components of heart rate variability [9].

Contrary to previous research who conducted a study on Cardiovascular Responses during Head-Down Crooked Kneeling Position Assumed in Muslim Prayers. This study aimed to better understand healthy volunteers' cardiovascular reactions to the HDCK position, which is used in Muslim prayers. They hypothesized that the cardiovascular parameters of the male and female participants at various times throughout Sujood would not significantly differ from one another. The key conclusion was that both male and female participants' systolic and diastolic blood pressures considerably decreased after Sujood compared to baseline levels, but that these decreases did not last through the third minute of the position [10]. Previously a study was done on The Effect of Hatha Yoga Therapy on the Blood Pressure of Primary Hypertension Patients of Productive Age. The study aimed to determine the effect of hatha yoga therapy on the blood pressure of those of productive age among primary hypertension patients. The findings showed that individuals with primary hypertension in the intervention group had mean systolic and diastolic blood pressures of 161.84/93.25 mmHg, compared to 161.66 in the control group before the therapy. In the intervention group, the main hypertension patients' mean systolic and diastolic blood pressure after therapy was 122.87/71.69 mmHg, while in the control group, it was 127.66/73.13 mmHg. Among patients with primary hypertension, hatha yoga therapy has the effect of lowering blood pressure in those who are of fertile age [11].

One potential reason for elevated blood pressure in diabetic individuals when assuming a head-down, crooked kneeling position is due to hyperinsulinemia resulting from insulin resistance. These excessive insulin levels prompt increased reabsorption of sodium, leading to greater sodium retention and an expansion of circulating plasma volume. Additionally, hyperinsulinemia triggers the activation of both the renin-angiotensin-aldosterone system (RAAS) and the sympathetic nervous system (SNS). This activation, in turn, promotes the growth of vascular smooth muscle cells, contributing to heightened peripheral vascular resistance and ultimately accelerating the development of atherosclerosis [12].

Conclusion

This study revealed a significant increase in systolic and diastolic blood pressures and an increase in pulse rate during HDCK. Also, our findings showed no significant gender difference in the effect of HDCK on cardiovascular parameters except systolic variable. These findings indicate that the blood pressure of the Diabetic patient was elevated during Sujood. It is possible that the observed increase in heart rate and blood pressure is due to a change in autonomic nervous system activity, these findings suggest that healthcare providers should be aware of the potential cardiovascular effects of

Table 2: Independent T-test for comparing Heart rate, Systolic Bp and Diastolic Bp.

Heart Rate	mean (SD)	p - value
Before	84.00 ± 10.37	.000
During	86.37 ± 10.66	
After	84.55 ± 9.94	
Systolic Blood Pressure (mmHg)		
Before	126.0 ± 12.84	.000
During	132.3 ± 12.37	
After	127.2 ± 9.94	
Diastolic Blood Pressure (mmHg)		
Before	81.27 ± 9.93	.000
During	84.75 ± 9.43	
After	82.80 ± 8.55	



head down crooked kneeling position in diabetic patients, and should consider monitoring cardiovascular function during this position.

Limitations and suggestions

The use of self-reported data may have introduced bias into the study, as participants may have under- or over-reported their symptoms or behaviors. Future studies could consider using objective measures of cardiovascular function and physical activity to reduce the risk of bias.

This study did not explore the potential mechanisms underlying the observed effects of the head down crooked kneeling position on cardiovascular function. Future research could use more sophisticated methods, such as imaging or biomarker analysis, to explore these mechanisms and identify potential targets for intervention.

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