Visceral Adiposity, Bio physiological Parameters, Stress, Quality of sleep and Hypertension

Dr. Kripa Angeline A[1], Dr. Sara B[2], Ms.Thamizhselvi[3] and Ms. Anbu M[4]

1. Professor, Medical & Surgical Nursing, Kasturba Gandhi Nursing College, Sri Balaji Vidyapeeth, Puducherry, India.
2. Reader, Rani Meyyammai College of Nursing, Annamalai University, Chidambaram, India
3. Nurse Educator, Mahatma Gandhi Medical College & Research Institute, Sri Balaji Vidyapeeth, Puducherry, India.
4. Nursing Officer, JIPMER, Puducherry, India.

Introduction:

Health is the greatest wealth in today's world which is undergoing rapid changes. Being healthy and fit is a choice[1]. Maintaining good health is very essential for leading a pro-active and fully functioning life[2]. According to WHO report (2020) on the global burden of disease, cardiovascular diseases is on the top with 365.87 million people[3]. The epidemic of Non communicable Diseases poses devastating health consequences for individuals, families and communities, and threatens to overwhelm health systems[2]. Hypertension is a silent disease and is almost without obvious symptoms in its early stages. Patients are healthy at this stage and have good performance[4,5]. Hypertension also known as high or raised blood pressure, is a condition in which the blood vessels have persistently raised pressure[6,7].

Hypertension is a serious medical condition and can increase the risk of heart, brain, kidney and other diseases[8]. WHO follows and tracks the NCD Global action plan with 9 target to be achieved by 2025. Among the nine, the sixth target is a 25% relative reduction in the prevalence of raised blood pressure or contain the prevalence of raised blood pressure, according to national circumstances and the target 7 is Halt the rise in diabetes and obesity[9,10].

Statement of the Problem:

Correlation between Visceral Adiposity, Bio physiological Parameters Level of stress and quality of sleep among hypertensive Population

Objectives of the Study:

To find out the correlation between visceral adiposity, selected bio-physiologic parameters, and level of stress and quality of sleep, among samples with hypertension.

Hypothesis:

There is a significant correlation between visceral adiposity (BMI, Hip Waist Ratio), bio-physiological parameters (blood glucose level, lipid profile, blood pressure) level of stress, quality of sleep among samples with hypertension.

Correlation between (BMI, Hip Waist Ratio) and Selected Bio-physiologic Parameters (Fasting Blood Glucose Level, Lipid Profile, Blood Pressure), Level of Stress, Quality of Sleep among Hypertensive samples with Visceral Adiposity

Assessment Score	BMI	WHR	TC	TG	LDL	HDL	BG	BP	Stress	Sleep
BMI	1	0.152	0.184	0.121	.203**	-0.182	0.107	.237*	.244*	.208*
WHR	0.152	1	0.098	0.188	0.114	-0.079	161	.197*	.279*	.216*
TC	0.184	0.098	1	.949**	0.133	-.332**	.968**	0.123	0.12	0.12
TG	121	0.188	.949**	1	0.006	-.372**	.987**	0.048	0.161	0.176
VLDL	0.152	0.084	.343**	.376**	0.174	-.291**	.392**	0.047	0.176	0.102

LDL	.203*	0.114	0.133	0.006	1	-.215*	0.015	.733**	.226*	.209*
HDL	-0.182	-0.079	-.332**	-.372**	-.215*	1	-.390**	-0.021	-.204*	-.207*
BG	0.107	0.161	.968**	.987**	0.015	-.390**	1	0.068	0.162	0.178
BP	.237*	.197*	0.123	0.048	.733**	-0.021	0.068	1	0.244	.231*
Stress	.244*	.279**	0.12	0.161	.226*	-.204*	0.162	.244*	1	.213*
Sleep	.208*	.216*	0.12	0.176	0.209	-.207*	0.178	.231*	.213*	1

N=100

Table 1: Correlation between visceral adiposity(BMI, Hip Waist Ratio), bio-physiologic parameters (blood glucose level, lipid profile, blood pressure) and Stress and Sleep score among Hypertensive samples

N=100

Assessment Score	BMI	WHR	TC	TG	LDL	HDL	BG	BP	Stress	Sleep
BMI	1	.152	-.184	-.121	-.103	-.182	-.107	-.197	.004	.008
WHR	.152	1	.098	.188	-.114	.079	.161	-.197*	.169	.176
TC	-.184	.098	1	.449**	.133	-.332**	.468**	.123	.120	.120
TG	-.121	.188	.449**	1	.006	-.372**	.487**	.048	.161	.176
LDL	-.303**	-.114	.133	.006	1	.215*	.015	.733**	-.126	.069
HDL	-.182	.079	-.332**	-.372**	.215*	1	-.390**	-.021	184	-.107
BG	-.107	.161	.468**	.487**	.015	-.390**	1	.068	.161	.178
BP	-.237*	-.197*	.123	.048	.733**	-.021	.068	1	.184	.031
Stress	.004	.169	.120	.161	.126	-.184	.161	.184	1	.113
Sleep	.008	.176	.120	.176	0.69	-.107	.178	.031	.213*	1

Table 2: Correlation between visceral adiposity (BMI, Hip Waist Ratio), bio-physiologic parameters (blood glucose level, lipid profile, blood pressure) and Stress and Sleep score among hypertensive samples

Objective: To find out the correlation between (BMI, Hip waist ratio)and selected bio physiologic parameters (fasting blood glucose level, lipid profile, blood pressure), level of stress, quality of sleep among hypertensive samples with visceral adiposity.

Among the samples, there was a significant positive moderate correlation between BMI & LDL at r=.20**, p<0.01. With regard to BMI and WHR, TC, TG, LDL, BG, BP, Stress & sleep score there was positive correlation. There was a negative correlation between BMI and HDL (p>0.05). There was a significant positive correlation between BMI and WHR, Stress, sleep.

The present study findings are supported by Camhi et al. (2011)reported that WC and BMI correlations were highest for Fat Mass (FM) and Adipose Tissue (AT) compared to Visceral Adiposity (VA). Women had higher FM levels than men regardless of WC, but the sex difference in FM was attenuated in younger adults with a high BMI.

Kouvonen et al. (2005) also reported that that lower job control, higher job strain, and higher effort–reward imbalance were associated with a higher BMI. In men, lower job demands were also associated with a higher BMI.

Pertaining to WHR, there was a significant positive fair correlation among stress at r=27, p<0.001 and sleep at r=.21,p<0.001With regard to WHR and BMI, TC, TG, LDL, BG, BP, was a significant positive correlation (p<0.001) and WHR Vs HDL was negatively correlated (p>0.05). There was a significant positive correlation between WHR and BMI, TC, TG, HDL BG, Stress, sleep (p>0.05).

Gupta et al. (2007) concluded that there was a significant positive correlation of BMI, waist-size and WHR with systolic BP (r= 0.46 to 0.13), diastolic BP (0.42 to 0.16), fasting glucose (0.15 to 0.26), and LDL cholesterol (0.16 to 0.03) and negative correlation with physical activity and HDL cholesterol (-0.22 to -0.08) in both men and women (p<0.01).

Pertaining to TC, there was a significant positive Strong correlation among TG at r=.94, p<0.001 and BG at r=.96, p<0.001.With regard to TC and BMI, WHR, LDL, BG, level of stress and sleep was found to be significant positive correlation (p<0.001) and TC vs HDL was negatively correlated (p>0.05). Pertaining to TC, there was a significant positive fair correlation among BG at r=.46, p<0.001 with regard to TC and WHR, LDL, BP, level of stress and sleep was found to be significant positive correlation (p<0.001) and TC vs BMI, HDL, found to be negatively correlated (p>0.05).

Anika et al. (2015) concluded that There was a significant correlation between systolic blood pressure with total cholesterol (p = 0.009, r = 0.401) and diastolic blood pressure with triglycerides (p = 0.003, r = 0.457).Haba et al. (2019) also reported that BP was better correlated with hypercholesterolemia than BP at discharge, especially total cholesterol and HDL. All lipid markers were increased in patients with higher grades of arterial hypertension, total cholesterol having the best statistical significance (149.38[+ or -] 40.04--grade 1 vs 197.29 [+ or -] 54.75--grade 2 vs 187.88 [+ or -] 44.29 mg/dl--grade 3, p=0.015). LDL presented higher values in the Hypertensive samples; group with newly diagnosed diabetes (121.36 [+ or -] 39.84 vs. 97.31 [+ or -] 37.51 mg/dl, p=0.023.

With respect to Triglycerides and TC at r=.94,p<0.001, Blood Glucose r=.98, p<0.001,there was a significant positive Strong correlation (p<0.001. There was a negative correlation between TG vs HDL (p>0.05).With respect to Triglycerides, there was a significant positive Strong correlation (p<0.001) among TC at r=.44,p<0.001 and BG at r=.48, p<0.001. There was a negative correlation found between TG vs BMI, HDL (p>0.05).

Kondo et al. (2011) concluded that TG concentrations correlated negatively with the predominant LDL size (r= -0.650) and HDL-C concentration(r = -0.556). Telles et al. (2018) conclude that triglycerides showed a significant negative correlation with BMI and body fat. HDL cholesterol was significantly negatively correlated with waist circumference and positively correlated with body fat. Total cholesterol/HDL ratio was positively correlated with waist circumference and negatively correlated with body fat. A significant positive correlation of FBG and waist circumference was also observed.

With regard to correlation between LDL and BP at r=.73, p<0.001, there was a significant substantial positive correlation. As the LDL and BMI, WHR, TC, TG, BG, level of stress and sleeping difficulty had significant positive correlation. There was a negative correlation between LDL vs HDL (p>0.05). With regard to correlation between LDL and BP at r=.73, p<0.001, there was a significant substantial positive correlation. With respect to correlation between LDL and TC, TG, BG, HDL, BG and sleeping difficulty had significant positive correlation. There was a negative correlation found between LDL vs BMI, WHR, Stress (p>0.05).

Mattos et al. (2020) concluded that LDL and total cholesterol levels of poor sleepers were higher than those of good sleepers (103 v. 81; p = 0.003and 178.0 v. 159.5 mg/dL; p = 0.009, respectively). Three patients (4%) were at high risk of obstructive sleep apnea syndrome (OSAS) according to the Berlin Questionnaire.

With regard to correlation between HDL and BMI, WHR, TC, TG, BG, BP, level of stress and sleeping difficulty had negative correlation (p>0.05). With regard to correlation between HDL and WHR, LDL, level of stress had significant positive correlation. care(p<0.001), whereas remaining variables such as BMI, TC,TG, BG, BP and sleeping difficulty found to be negatively correlated (p>0.05).With regard to correlation between Blood Glucose and TC at r=.96 p<0.001, TG at r=.98,p<0.001 there was a significant strong positive correlation. With regard to BG and BMI, WHR, LDL, BP, level of stress and sleeping difficulty had significant positive correlation. There was a negative correlation between BG vs HDL (p>0.05).

With regard to correlation between Blood Glucose and TC at r=.46, p<0.001,TG (r=.48, p<0.001) there was a significant moderate positive correlation. The correlation between BG and WHR, LDL, BP, level of stress and sleeping difficulty had significant positive correlation. There was a negative correlation found between BG vs BMI, HDL (p>0.05).

Hanif et al. (2001) reported that FBG, TC and HDL ratios were increased in the patient group (p = < 0.001). Comparison of FBG and TC:HDL ratios revealed a highly significant rise (p = < 0.001) in the patient group. FBG with TC:HDL ratios between both groups showed a positive correlation (r = 0.554).

With regard to correlation between BloodPressure and LDL at r=.73 p<0.001, there was a significant Substantial positive correlation. The correlation between BP and BMI, WHR, TC, TG, LDL,BG, level of stress and sleeping difficulty had significant positive correlation. There was a negative correlation between BP vs HDL (p>0.05).

With regard to correlation between Blood Pressure and LDL at r=.73p<0.001, there was a significant Substantial positive correlation. With respect to BP and TC, TG, BG, level of stress and sleeping difficulty had significant positive correlation. There was a negative correlation found between BP vs BMI, WHR, HDL (p>0.05).

With regard to correlation between Stress and WHR at r=.27, p<0.001, there was a significant Fair positive correlation. The correlation between Stress and BMI, WHR, TC, TG, LDL, BG, BP, and sleeping difficulty had significant positive correlation. There was a negative correlation between stress vs HDL (p>0.05).With regard to correlation between Stress and BMI, WHR, TC, TG, LDL, BG, BP, and sleeping difficulty had significant positive correlation p<0.001). There was a negative correlation found between stress vs HDL (p>0.05).

Drapeau et al. (2003) also reported that abdominal obesity is associated with an increased cortisol clearance. Hormonal and enzymatic changes have been implicated in this preferential body fat accumulation in response to stress. Considering the correlation between Sleep and BMI, WHR, TC, TG, LDL, BG, BP, and stress had significant positive correlation. There was a negative correlation between sleep vs HDL (p>0.05). Considering the correlation between Sleep and BMI, WHR, TC, TG, LDL, BG, BP, and stress had significant positive correlation. There was a negative correlation found between sleep vs HDL (p>0.05).

Collier (2020) also reported that adjusted results also show a positive correlation between accelerometer sleep and total cholesterol. Each additional hour of accelerometer sleep there was as an increase of .2 mg/dl of total cholesterol levels (p-.04). These positive correlations are potentially meaningful, as higher cholesterol levels are associated with a higher risk of cardiovascular disease.

Thus, the hypothesis H1 stating "Significant correlation between visceral adiposity (BMI, Hip Waist Ratio), bio physiological parameters (fasting blood glucose level, lipid profile, blood pressure), level of stress and quality of sleep among samples with hypertension **was accepted".**

Conclusion

Hypertension is the leading cause of death due to cardiac diseases. Lifestyle modification is the universal "Vaccine" against Hypertension. Primary prevention of hypertension should be highlighted and it should get more priority than it is getting now.

Visceral adiposity, bio physiological parameters, stress and quality of sleep often coexist leading to alteration in multiple patho physiological mechanisms and complications. It may contribute, at least in part, to some of the pathological processes towards obesity as alone or with stressful life pattern and poor quality of sleep, most commonly sympathetic over activity, metabolic, and neuro endocrine abnormalities. Compiled data support the correlation of visceral adiposity, bio physiological parameters, stress and quality of sleep with hypertension. Stress and quality of sleep probably contributes to or exacerbates the hypertension in addition to visceral adiposity and bio physiological parameters. Hypertension should be strongly suspected in obese individuals with unexplained weight gain or difficulty losing weight, higher level of stress and poor quality of sleep. The early identification of such risk factors can be corrected and hypertension can be kept under control as primary prevention.

REFERENCES:

1. World Health Organization, Public Health Agency of Canada. Preventing chronic diseases: a vital investment. World Health Organization; 2005 Sep 28.
2. https://www.who.int/health-topics/noncommunicable-diseases
3. https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)
4. Shamsi A, Nayeri ND, Esmaeili M. Living with hypertension: A qualitative research.

International journal of community-based nursing and midwifery. 2017 Jul;5(3):219.

5. World Health Organization. Hypertension and coronary heart disease: classification and criteria for epidemiological studies, first report of the Expert Committee on Cardiovascular Diseases and Hypertension [meeting held in Geneva from 13 to 18 October 1958]. World Health Organization; 1959.
6. Zeng Z, Chen J, Xiao C, Chen W. A global view on prevalence of hypertension and human develop index. Annals of global health. 2020;86(1).
7. Joint National Committee on Detection, Treatment of High Blood Pressure. The 1988 report of the Joint National Committee on detection, evaluation, and treatment of high blood pressure. US Department of Health and Human Services, Public Health Service, National Institutes of Health; 1988.
8. Papadopoulos DP, Mourouzis I, Thomopoulos C, Makris T, Papademetriou V. Hypertension crisis. Blood pressure. 2010 Dec 1;19(6):328-36.
9. Goryakin Y, Vuik S, Cecchini M. Promoting healthier diets and active lifestyles: Policies and best practices.
10. Sacco RL, Roth GA, Reddy KS, Arnett DK, Bonita R, Gaziano TA, Heidenreich PA, Huffman MD, Mayosi BM, Mendis S, Murray CJ. The heart of 25 by 25: achieving the goal of reducing global and regional premature deaths from cardiovascular diseases and stroke: a modeling study from the American Heart Association and World Heart Federation. Circulation. 2016 Jun 7;133(23):e674-90.