

Assessment of Influence of Basal Metabolic Rate on Blood Pressure Among Adult Patients: An Institutional Based Study

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ABSTRACT

Background: Basal Metabolic Rate (BMR) represents the largest component of total energy expenditure and is a major contributor to energy balance. Hypertension is an important global health issue and is currently increasing at a rapid pace in most industrializing nations. Hence; under the light of above mentioned data, the present study was planned for assessing the influence of basal metabolic rate on blood pressure among adult patients.

Materials & Methods: A total of 100 subjects were included in the present study. Complete demographic details of all the subjects were obtained. Assessment of smoking status, residence details and past medical history was done. Hemodynamic parameters of all the patients were recorded. Weight and height of all the patients was calculated. BMR was assessed on the basis of these parameters.

Results: Mean age of the patients of the present study was 53.4 years. 60 patients in the present study were males while the remaining 40 patients were females. Significant correlation was observed in between BMR and blood pressure.

Conclusion: BMR had positive influential effect on the blood pressure. However; further studies are recommended.

Keywords: Basal Metabolic Rate, Blood Pressure.


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INTRODUCTION

Basal Metabolic Rate (BMR) represents the largest component of total energy expenditure and is a major contributor to energy balance. Therefore, accurately estimating BMR is critical for developing rigorous obesity prevention and control strategies. Over the past several decades, numerous BMR formulas have been developed targeted to different population groups. Hypertension is an important global health issue and is currently increasing at a rapid pace in most industrializing nations.¹⁻³ Although a number of risk factors have been linked with the development of hypertension, including obesity, high dietary sodium, and chronic psychosocial stress, these factors cannot fully explain the variation in blood pressure and hypertension rates that occurs within and between populations.⁴⁻⁷ Hence; under the light of above mentioned data, the present study was planned for assessing the influence of basal metabolic rate on blood pressure among adult patients.

MATERIALS & METHODS

The present study was planned in the Department of General Medicine, Rama Medical College Hospital & Research Centre, Hapur, UP (India) and it included assessment of influence of basal metabolic rate on blood pressure among adult patients. Ethical approval was obtained from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. A total of 100 subjects were included in the present study. Complete demographic details of all the subjects were obtained. Assessment of smoking status, residence details and past medical history was done. Hemodynamic parameters of all the patients were recorded. Weight and height of all the patients was calculated. BMR was assessed on the basis of these parameters. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. Univariate regression curve was used for assessment of level of significance.

RESULTS

In the present study, analysis of a total of 100 patients was done. Majority of the patients belonged to the age group of more than 50 years. Mean age of the patients of the present study was 53.4 years. 60 patients in the present study were males while the

remaining 40 patients were females. Mean systolic blood pressure was found to be 122.5 mm of Hg while mean diastolic blood pressure was found to be 84.5 mm of Hg. Significant correlation was observed in between BMR and blood pressure.

Table 1: Demographic data

Parameter		n
Age group (years)	Less than 30	30
	30 to 50	30
	More than 50	40
Gender	Males	60
	Females	40

Table 2: Effect of BMR on blood pressure

Parameter	Value	p- value
Mean systolic blood pressure	122.5	0.01 (Significant)
Mean diastolic blood pressure	84.5	
Mean BMR (kcal per day)	1352	
Univariate analysis	10.28	

DISCUSSION

The association between body mass and blood pressure (BP) has been widely reported, and obesity is considered a major risk factor for hypertension (HTN). Despite considerable scientific effort, the underlying causal mechanisms remain to be clearly elucidated, partly due to the widespread impact of obesity (or the process of becoming obese) on endocrine, physiologic, and metabolic function.⁸ Furthermore, the temporal relationship between BP and weight gain, weight loss, and/or (re) distribution of weight remains controversial, and complicating matters further, HTN does not present uniformly with obesity and is commonly observed in lean individuals. Notwithstanding these challenges, several potential underlying mechanisms (i.e. ion exchange, sympathetic tone, insulin sensitivity, oxidative stress, etc.) have been identified as mediators of BP and are thought to impact BP before appreciable weight gain occurs.⁹

In the present study, analysis of a total of 100 patients was done. Majority of the patients belonged to the age group of more than 50 years. Mean age of the patients of the present study was 53.4 years. 60 patients in the present study were males while the remaining 40 patients were females. Hypertension (HTN) is a major risk factor for the development of cardiovascular disease, while high blood pressure (BP) is associated with small artery and organ damage. The relationship between body mass and BP has been widely reported, and obesity is considered a major risk factor for HTN. However, HTN does not present uniformly with obesity and is commonly observed in lean individuals. Several potential underlying mechanisms (i.e., sympathetic tone, insulin sensitivity, oxidative stress, etc.) influence BP and are thought to impact BP before appreciable weight gain occurs.^{10, 11}

In the present study, mean systolic blood pressure was found to be 122.5 mm of Hg while mean diastolic blood pressure was found to be 84.5 mm of Hg. Significant correlation was observed

in between BMR and blood pressure. Ballor DL et al compared physical characteristics, cardiovascular risk factors, and resting metabolic rate (RMR) in a cohort of 82 young women separated into three groups: sedentary (SED, n = 48), aerobically trained (AT, n = 21), and resistance trained (RT, n = 13). Body mass and fat-free mass (FFM) were not different between groups whereas percent body fat was lower in the AT (16.2 +/- 0.7%) and RT (14.7 +/- 0.8%) groups than in the SED group (21.8 +/- 0.8%). There were no between-group differences for blood pressure or blood lipids. RMRs (kJ/min) for the AT (4.31 +/- 0.06) and RT (4.25 +/- 0.09) groups were significantly greater than those for the SED group (3.99 +/- 0.05). When adjusted for differences in FFM, RMRs for the AT group (4.24 +/- 0.05) were different from those of both the RT (4.13 +/- 0.05) and SED (4.05 +/- 0.03) groups; RMRs for the RT and SED groups were not different from each other. No differences were found in cardiovascular risk in young non-obese women of differing exercise status.¹²

CONCLUSION

From the above results, the authors concluded that BMR had positive influential effect on the blood pressure. However; further studies are recommended.

REFERENCES

1. Imazu M. Hypertension and insulin disorders. *Curr Hypertens Rep.* 2002;4:477–82.
2. Landsberg L. Pathophysiology of obesity-related hypertension: role of insulin and the sympathetic nervous system. *J Cardiovasc Pharmacol.* 1994;23:S1–S8.
3. Abdel-Hamid TK. Modeling the dynamics of human energy regulation and its implications for obesity treatment. *System Dynamics Review.* 2002;18(4):431–71.

4. Ferrannini E. The theoretical bases of indirect calorimetry: A review. *Metabolism*. 1988;37(3):287–301.
5. Papadoyannis IN. HPLC in clinical chemistry. New York: Marcel Dekker; 1990. 287–309.
6. Masuo K. Obesity-related hypertension: role of sympathetic nervous system, insulin, and leptin. *Curr Hypertens Rep*. 2002;4:112–8. [PubMed] [Google Scholar]
7. Hall JE. The kidney, hypertension, and obesity. *Hypertension*. 2003;41:625–33.
8. Pi-Sunyer X. A clinical view of the obesity problem. *Science*. 2003;299:859–60.
9. Bogardus C, Lillioja S, Ravussin E, Abbott W, Zawadzki JK, Young A, et al. Familial dependence of the resting metabolic rate. *N Engl J Med*. 1986;315(2):96–100.
10. Kvist H, Chowdhury B, Grangård U, Tylén U, Sjöström L. Total and visceral adipose-tissue volumes derived from measurements with computed tomography in adults men and women: predictive equations. *Am J Clin Nutr*. 1988;48:1351–61.
11. Poehlman ET. Energy expenditure and requirements in aging humans. *J Nutr*. 1992;122(11):2057–65.
12. Ballor DL, Poehlman ET. Resting metabolic rate and coronary-heart-disease risk factors in aerobically and resistance-trained women. *Am J Clin Nutr*. 1992 Dec;56(6):968-74.

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