

# RELATIONSHIP OF BRAIN NATRIURETIC PEPTIDE WITH SERUM LIPIDS AND BODY MASS INDEX IN HEALTHY ADULT MALES

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**ABSTRACT...** Prevalence of morbid obesity has increased dramatically world wide during past three decades. BNP a cardiac lipolytic hormone is found to be decreased in obese hypertensive and heart failure patients. Increasing values of BMI are associated with dyslipidemia. **Objective:** To find out the relationship of BNP with increasing values of BMI and individual serum lipid fractions in apparently healthy adult males. **Study Design:** Observational, cross-sectional study. **Setting:** Department of Physiology at Basic Medical Sciences Institute, Jinnah Post Graduate Medical Center, Karachi. **Material & Methods:** Study included 85 adult males, aged between 20-60 years. All were non-smokers, non-diabetic, having no other chronic illness and not taking any lipid lowering therapy. Study participants were evaluated for lipid profile and divided into three groups for the calculated BMI values according to WHO and International Obesity Task Force. Brain Natriuretic Peptide was assayed by AxSym technology. **Results:** Brain Natriuretic Peptide developed a negative correlation with BMI, total and LDL-cholesterol and a positive relation with HDL-cholesterol and triglycerides. **Conclusions:** This study concluded that Brain Natriuretic Peptide is negatively related with increasing values of BMI and degree of dyslipidemia in apparently healthy adult males.

**Key words:** Brain Natriuretic Peptide, Serum Lipids, Body Mass Index.

**INTRODUCTION**

The morbid obesity has been postulated as the leading modifiable cause of cardiovascular disease in Asia<sup>1</sup> and its prevalence has doubled in the past decade<sup>2</sup>. Ventricular BNP release being transcriptionally regulated by cardiac wall stretch<sup>3</sup> is inversely related to BMI in obese patients<sup>4</sup>. Suppressed plasma BNP levels are also reported in obese individuals with heart failure<sup>5,6</sup>. Raised triglycerides and low HDL-cholesterol are related to obesity<sup>7</sup>. BNP does not correlate with serum lipids<sup>11</sup>.

BNP through its lipolytic and lipomobilizing effects<sup>8</sup> reduce the incidence of overweight and obesity<sup>9</sup>. No

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study was found to disclose the relation of BNP with individual serum lipid fractions and the increasing values of BMI in apparently healthy adult males. So this study was designed to achieve these goals.

### MATERIAL AND METHODS

This study was carried out during February to October 2007 at Basic Medical Sciences Institute JPMC, Karachi.

### INCLUSION CRITERIA

This study included a total of 85 apparently healthy males ranging between the ages of 20-60 years. The selected subjects had no history of any chronic systemic illness. All were non-smokers and not taking any lipid lowering therapy.

### EXCLUSION CRITERIA

Exclusion was made on the basis of history and lab findings (TLC  $>10.9 \times 10^9$  /L or  $<3.9 \times 10^9$ /L, C-Reactive protein  $>6$  mg/L, Serum Creatinine  $>1.1$  mg/dl, Fasting Blood Sugar  $>115$  mg/dl). Blood samples from the subjects were collected between 8 to 10 AM after a fast of 12 to 14 hours. Samples were preserved at  $-20^\circ\text{C}$ . BNP was determined by AxSYM technology based on microparticle enzyme immunoassay (MEIA) using kit Reference No. 8G82-20ABBL001/R4 provided by Abbot Diagnostic Laboratories. Serum triglycerides, total cholesterol and

HDL-cholesterol were determined by enzymatic colorimetric method. LDL-cholesterol was estimated according to Friedwald formula.

Body Mass Index (BMI) was calculated as:-  
Weight (Kg)/Height ( $\text{m}^2$ )

Subjects of the population were divided each into two groups on the basis of individual lipid type as desirable and undesirable values respectively according to National cholesterol education programme, Adults treatment Panel-III (ATP-III)<sup>19</sup>.

To study the relationship between BMI and BNP levels population was divided into three groups on the basis of their calculated BMI values as Lean ( $<20$ ), Normal (20-25) and Overweight ( $>25$ ) according to WHO and International Obesity Task Force<sup>20</sup>.

### RESULTS

In our study BNP could not develop any statistically significant relationship with serum lipids. Coefficient of correlation (r) between BNP and lipid profile disclosed a positive relationship with HDL-cholesterol and triglycerides while a negative relationship with total and LDL-cholesterol as shown in Table-I.

Table-I. BNP on the basis of Lipid profile.

Lipid Profile		n	Mean (pg/ml)	$\pm$ SEM	P-value	R-value
Cholesterol (mg/dl)	< 200	76	22.8	3.83	0.284	-0.03
	$\geq$ 200	9	10.6	3.62		
Triglyceride (mg/dl)	< 150	66	21.1	3.66	0.843	0.14
	$\geq$ 150	19	22.8	9.05		
HDL (mg/dl)	< 35	14	20.3	11.26	0.877	0.03
	$\geq$ 35	71	21.7	3.54		
LDL (mg/dl)	$\leq$ 100	43	27.2	5.88	0.099	-0.12
	> 100	42	15.7	3.44		

BNP levels were found to be low in dyslipidemics when compared with controls as shown in Table-II.

A decrease in BNP levels from 29.1 to 18.7 pg/dl was found with the increasing values of BMI and dyslipidemia. Hence a negative but statistically non-significant correlation was found between BNP and BMI ( $P < 0.642$   $r = -0.10$ ) as shown in Table-III.

Lipid Status	n	Mean (pg/ml)	$\pm$ SEM	P-value
Normal	37	23.7	5.37	0.566
Dyslipidemia	48	19.7	4.56	

BMI	No. of object	Triglyceride (mg/dl) Mean $\pm$ SEM	Cholesterol (mg/dl) Mean $\pm$ SEM	HDL (mg/dl) Mean $\pm$ SEM	LDL (mg/dl) Mean $\pm$ SEM	BNP (pg/ml) Mean $\pm$ SEM
< 20	6	95.5 $\pm$ 15.47	157.0 $\pm$ 11.11	41.2 $\pm$ 1.17	97.2 $\pm$ 10.69	29.1 $\pm$ 10.1
20-25	33	134.8 $\pm$ 10.70	165.6 $\pm$ 5.25	38.3 $\pm$ 0.90	99.5 $\pm$ 4.58	24.0 $\pm$ 6.22
> 25	46	137.3 $\pm$ 11.14	163.8 $\pm$ 4.32	38.7 $\pm$ 0.79	97.5 $\pm$ 3.59	18.7 $\pm$ 3.47
$P = 0.642$ ; $r = -0.10$						

## DISCUSSION

BNP one of the member of natriuretic peptide family is secreted mainly by ventricular myocardium and plays its role via interactions with NPR-A receptors<sup>3</sup>. NPR-A binding sites are present on human fat cell membranes and BNP has been found to a potent lipolytic and lipomobilizing hormone through a cGMP-dependent protein kinase signaling pathway independent of cAMP production and PKA activity<sup>8</sup>. BNP via such effects can change the metabolic state and reduce the incidence of overweight and obesity by influencing lipid metabolism. BNP levels are significantly lower in obese patients with advanced heart failure<sup>5,6</sup>. Wang et al<sup>10</sup> also demonstrated an inverse relationship between BNP and obesity while others have not found this association<sup>11</sup>. Finding of lower circulating BNP levels in obese patients has cast a doubt about utility of this biomarker in patients with a high BMI, a population of patients in whom evaluation is often challenging owing to the effects of their weight on clinical histories and particularly physical examination findings.

Raised triglycerides and low HDL-cholesterol both are related to obesity<sup>7</sup>. Our study also found that increasing

dyslipidemia was responsible for the increase in BMI values as shown in Table-III. An inverse relation between BNP and BMI was found by Iwanaga<sup>5</sup> and Horwich<sup>6</sup> in obese heart failure patients while our study found the same but in apparently healthy adult males with progressively rising values of BMI. The link between increasing BMI and low BNP levels is not yet fully elucidated. Probably there may be increased expression of clearance receptors by adipose tissue resulting in clearance of BNP in subjects with increasing BMI<sup>10</sup>. More recently there is decreased release of BNP from heart rather than increased clearance responsible for such association<sup>12,13,14</sup>. In our study this relationship was independent of age contradicting to McCord et al<sup>15</sup> who explained that lower BMI was associated with higher BNP because of a common relation to older age.

The potential contribution of natriuretic peptides in lipid metabolism of human subcutaneous adipose tissue can have physiological repercussions<sup>16</sup>. In this study BNP could not develop any significant relationship with serum lipids as stated by Kanda et al<sup>11</sup>. While relating BNP with individual lipid fractions in desirable and undesirable states a positive relation with triglycerides and HDL-

cholesterol and a negative relation with total and LDL-cholesterol was disclosed. Our results in context to HDL-cholesterol are in accordance with Lupattelli et al<sup>17</sup> who included only diagnosed severe hyperlipemics in comparison to our gradually changing values. Our results in healthy adults also relate with Michael et al<sup>18</sup> who found the same but in patients of metabolic syndrome.

## CONCLUSION

Our study found that BNP is inversely related with the increasing values of BMI, total and LDL-cholesterol and positively related with HDL-cholesterol and triglycerides in healthy adult males. BNP may be valuable as predictor and potential therapeutic target for risk stratification of obesity in primary care by general practitioners and helpful in deciding all those measures which may prevent or delay the establishment of obesity and many cardiovascular complications.

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*The line is a dot,  
that went for  
a walk.*

Shakeel Talat