



ISSN:2456-9739

Available Online at <http://www.bjbmr.org>

BRITISH JOURNAL OF BIO-MEDICAL RESEARCH

Cross Ref DOI: <https://doi.org/10.24942/bjbmr.2018.281>

Volume 02, Issue 04, July -August 2018

Research Article

Assessment Of Serum Interleukin-18 And Some Markers Of Hypertension

Oluboyo, A.O, Zaruq, A.O Oluboyo, B.O, Onyeaghala, A.A, Olayanju A.J

Department of Medical Laboratory Science, College of Medicine and Health Sciences, Afe Babalola University, Ado Ekiti, Ekiti State, Nigeria.

ARTICLE INFO

ABSTRACT

Article History:

Received on 10th July 2018
Peer Reviewed on 22nd July 2018
Revised on 14th August 2018
Published on 28th August 2018

Keywords:

Hypertension, Interleukin-18,
Blood pressure, Body mass
index

Hypertension is an increasingly important medical and public health challenge worldwide. It is associated with cardiovascular disease, insulin resistance, obesity, carbohydrate tolerance, hyperuricacidemia and atherosclerosis among other factors. The study aimed at assessing the serum level of interleukin-18 and some markers of hypertension. A total of 80 samples were collected; 40 samples were collected from hypertensive subjects and 40 samples from apparently healthy subjects to serve as control. The height and weight of each subject was measured using height gauge and bathroom scales to calculate BMI. The interleukin-18 level was estimated using Enzyme linked immunosorbent assay technique. The results revealed that interleukin 18, systolic and diastolic blood pressures were significantly increased ($P<0.001$) in hypertensive subjects compared with control while Interleukin-18 also increased with increasing age. Interleukin-18 levels significantly ($P<0.001$) correlated with systolic and diastolic blood pressure in hypertensive subjects and control. The study concluded that interleukin 18 which is a pro-inflammatory cytokine is a contributing factor to the pathogenesis and progression of hypertension since interleukin 18 was significantly increased in hypertensive subjects and significantly correlated with blood pressure, BMI and increased age.

Br J Bio Med Res Copyright©2018, **Oluboyo, A.O** et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material for any purpose, even commercially, provided the original work is properly cited and states its license

Corresponding Author: *Dr Adelo Oluboyo, Department of Medical Laboratory Science, College of Medicine and Health Sciences, Afe Babalola University, Ado Ekiti, Ekiti State, Nigeria.*

INTRODUCTION:

Hypertension is an increasingly important medical and public health challenge worldwide. It is associated with cardiovascular disease, insulin resistance, obesity, carbohydrate tolerance, hyperuricacidemia and atherosclerosis among other factors. The prevalence of hypertension in Nigeria has been shown to range from 8%-46.4% depending on the study target population, type of measurement and cut-off value used for defining hypertension¹. The prevalence was shown to be similar in men and women (7.9%-50.2% and 3.5%-68.8% respectively) and in the urban (8.1%-42.0%) and rural setting (13.5%-46.4%). However, a systematic review and Meta analysis estimated the overall prevalence of hypertension in Nigeria to be 28.9%². The causes of hypertension are multifactorial; although hypertension can be classified as either primary (essential) hypertension or secondary hypertension; about 90-95% of cases are categorized as 'primary hypertension' which means high blood pressure with no obvious underlying medical causes. It has been shown that 90-95% of all hypertension cases were categorized as essential hypertension, also known as primary hypertension or idiopathic hypertension³. It is a heterogeneous disorder as different patients have different factors that cause high blood pressure³. The cause of essential hypertension is still unknown but it is considered as the sum of interaction between genetic and multiple environmental factors.⁴

Experimental studies have shown that interleukin-18 enhances atherosclerosis through release of interferon gamma⁵ and induces expression of inflammatory cytokine interleukin-6 (IL-6) in the vascular endothelial and smooth muscle cells⁶.

Visceral fat is a relevant source of proinflammatory cytokines^{7,8} which are significantly elevated in serum of obese subjects⁹. It has been proposed that the vascular systemic inflammation produced by adipose tissues contributes to the development of

hypertension, since inflammation produces endothelial dysfunction¹⁰.

It has been shown that Interleukin-18 provides powerful information on future fatal cardiovascular events across the entire spectrum of patients with stable coronary artery disease (CAD) and patients with unstable CAD¹¹. Therefore, the assessment of serum interleukin 18 in Nigeria's population will be of immense value in the diagnosis of the aetiology of hypertension. Thus, the study aimed to assess serum interleukin-18 and some markers of hypertension and establish whether there is relationship between interleukin-18 and the markers.

MATERIALS AND METHODS

A total of eighty (80) subjects were investigated and classification was based on age and therapy. The subjects consist of 40 known hypertensive subjects and 40 apparently healthy subjects who served as control. Informed consent in written form was obtained from the subjects after due explanation before they participated in the study. Anthropometric measurement (body weight and height) was carried out in the subjects. Body weight was obtained using bathroom scales and height was obtained using a height gauge. Blood pressure was taken from the non dominant arm using appropriate cuff size and mercury sphygmomanometer. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were the first and the fifth koroktoff sounds respectively.

Venous blood sample of four millilitres (4ml) was collected from the cubital fossa and dispensed into a plain bottle (non anticoagulant bottle). The blood was allowed to clot and centrifuged at 12000rpm for 5 minutes to separate the serum from cells. The sample was stored at a temperature of -20 degree Celsius for up to 21 days before assayed. The method of analysis of interleukin 18 is based on Enzyme linked immunosorbent assay (ELISA).¹²

The results obtained were subjected to statistical analysis using SPSS 17. All

parameters were expressed as mean±SD. Student ‘t’ was the tool of choice and values were found to be statistically significant or otherwise at P<0.001 (version 21.0 software, SPSS Inc. Chicago, Illinois, USA).

RESULTS

Interleukin-18, Systolic blood pressure and diastolic blood pressure were statistically increased (P<0.001) when the levels in hypertensive subjects were compared with that of control. Body mass index was not

statistically significant at (P<0.001) when the level in hypertensive subjects was compared with that of control. When all parameters were analysed at different age group, ages 40-49 years predominates with an increased BMI followed by below 40years, 50-59years and 60years and above. Interleukin-18 levels significantly (P<0.001) correlated with systolic and diastolic blood pressure in hypertensives and controls. Interleukin-18 levels did not significantly correlate with ages in hypertensives and controls.

Table 1: Interleukin-18 and other markers in hypertensive subjects and control subjects

Variables	Hypertensives (N=40)	Control (N=40)	T values	P values
Interleukin-18 (Pg/ml)	688.3±1143.45	81.8±121.8	3.446	0.001***
Systolic blood pressure (mmHg)	154.8±10.03	115.0±6.04	21.390	0.000***
Diastolic blood pressure (mmHg)	97.7±5.63	74.1±2.76	13.459	0.000***
BMI (Kg/m ²)	24.9±3.86	24.0±3.69	1.047	0.2976

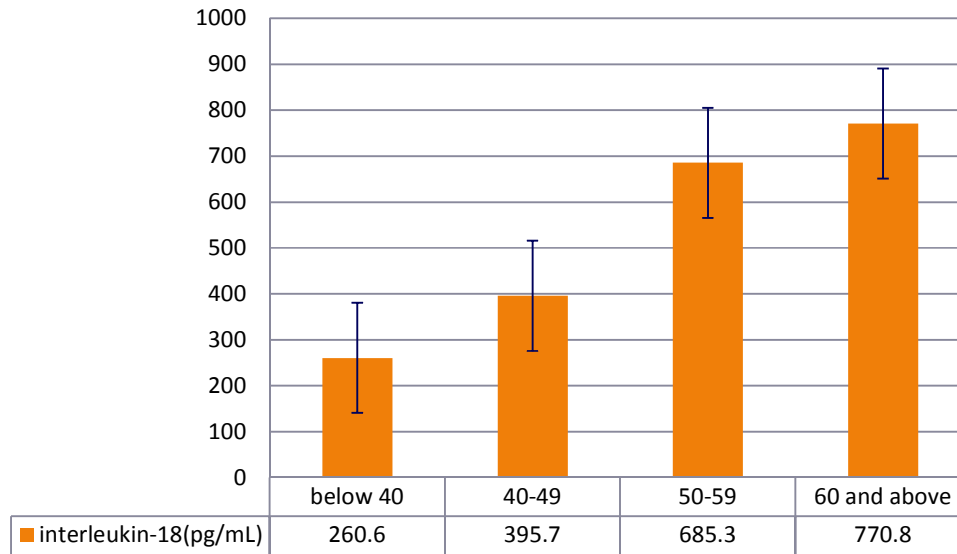
***--Significant at p<0.001

Table 2 :Correlation of interleukin-18 and other markers in hypertensive subjects and controls.

Groups	r value (P value)			
	Systolic BP	Diastolic BP	Age	BMI
Hypertensive subjects (n=40)	0.717**(.000)	0.833**(.000)	0.047 (.775)	-0.119 (0.464)
Controls (n=40)	0.765**(.000)	0.679**(.000)	-0.171 (.293)	0.019 (0.958)

** .Correlation is significant at the 0.001 level

*. Correlation is significant at the 0.05 level

Figure 1: Interleukin-18 levels in all age group in hypertensive subjects.

DISCUSSION

Interleukin-18 is a proinflammatory cytokine which may play an important role in heart failure via their effects on myocyte contractility, inflammation, cell death and endothelial function. In this study, there was a significant ($P < 0.001$) increase in the level of interleukin-18 compared with control, making it evident that hypertension is associated with increased interleukin-18 levels. This finding agrees with other findings^{13,14} which show that it is clear that circulating levels of IL-1 β and IL-18 are increased in hypertension^{13,14}. Interleukin-18 significantly correlates with blood pressure in hypertensive subjects and control. When all parameters were analysed at different age group, ages 60 years and above predominates with an increased interleukin 18 level followed by 50-59 years, then ages 40-49 years and below 40 years. This finding shows that interleukin-18 is a biomarker of ageing because interleukin-18 levels increases with age in hypertension. It also shows a positive correlation between interleukin-18 and ages in hypertensives. The increase in body weight and BMI with advanced age has been reported^{15,16}. Body mass index (BMI) was also assessed and compared between the two groups in this study. There was no statistically significant difference ($P < 0.001$) between BMI in hypertensives

subjects compared with control. These findings agree with other studies which support a strong relationship between BMI, blood pressure across and age in developed and developing countries¹⁷. This has also been supported by other works which showed that body composition variables such as weight, skin fold thickness are significantly correlated with blood pressure in adults^{18,19}.

Furthermore, in this study, there was a statistically significant increase ($P < 0.001$) between systolic BP in hypertensive subjects compared with control subjects. This finding indicate that systolic blood pressure is a classical parameter in the diagnosis of hypertension; it also gives an indication that the use of hypertensive drugs has blood pressure lowering effects²⁰. This finding also agreed with other researches which show that patients with elevation of both systolic blood pressure and diastolic blood pressure have been shown to benefit from drug treatment^{21,22}. When all parameters were analysed at different age groups; age 50-59 years predominates with a higher systolic and diastolic blood pressure followed by 60 years and above, 40-49 years and below 40 years. The increase in blood pressure with age is mostly associated with structural changes in the arteries and especially with large artery stiffness²³. An elevation in systolic blood

pressure is the most prevalent type of hypertension in those aged 50 and above, occurring either de novo or as a development after a long period of systolic-diastolic hypertension with or without treatment²³.

CONCLUSION

Thus, since interleukin 18 was significantly increased in hypertensive subjects and was significantly correlated with blood pressure, BMI and increased age, the study concluded that interleukin 18 which is a pro-inflammatory cytokine is a contributing factor to the pathogenesis and progression of hypertension. This may also be or contribute to the reason for the recent increase in sudden death in humans.

ACKNOWLEDGEMENTS

We would like to thank the staff members of the Department of Chemical Pathology, Ekiti State University Teaching Ado-Ekiti, Nigeria and all the patients who participated in the study.

REFERENCES

1. Ogah SO, Okpechi I, Chukwuonye II, Akinyemi JO, Onwubere BJC, Falase AO, Stewart S, Sliwa K. Blood pressure, prevalence of hypertension and related complications in Nigerian Africans: A review. *World Journal Cardiology*. 2012 4(12):327-340.
2. Adeyoye D, Basquill C, Aderemi AV, Obi FA. An estimate of the prevalence of hypertension in Nigeria: a systematic review and meta analysis. *Journal of hypertension*. 2015; 33(2):230-242.
3. Carretero OA, Oparil S, and Daniel E. Essential hypertension. Part 1a: Definition and etiology. *Circulation*. 2000; 101:329-335.
4. Büssesmaker E, Hillebrand U, Hausberg M, Pavenstädt H, Oberleithner H. Pathogenesis of hypertension: interactions among sodium, potassium, and aldosterone. *American Journal of Kidney Diseases*. 2010; 55 (6): 1111-1120.
5. Whitman SC, Ravisankar P, Daugherty A. Interleukin-18 enhances atherosclerosis in apolipoprotein E(-/-)mice through release of interferon gamma. *Circulation*. 2002; 90: 34-38.
6. Gerdes N, Sukhova GK, Libby P, Reynolds RS and Young JL. Expression of interleukin 18 and functional IL-18 receptor on human vascular endothelial cells, smooth muscle cells, and macrophages: implications for atherogenesis. *Journal Exp. Medicine*. 2002;195:245-257.
7. Ahima RS, Flier JS. Adipose tissue as an endocrine organ. *Trends in endocrinology and metabolism*. 2000; 11(8):327-332.
8. Fain JN, Madan AK, Hiler ML, Cheema P, Bahouth SW. Comparison of the release of adipokines by adipose tissues, adipose tissue matrix, adipocytes from visceral and subcutaneous abdominal adipose tissues of obese humans. *Endocrinology*. 2004; 145(5):2273-2284.
9. Fontana L, Eagon JC, Trujillo ME, Scherer E, Klein S. Visceral fat adipokine secretion is associated with systemic inflammation in obese humans. 2007; 56 (4):1010-1013.
10. Accini JL, Sotomayor F, Trujillo JG, Barrera L, Bautisa, Lopez-Jaramillo P. Colombian study to assess the use of noninvasive determination of endothelium-mediated vasodilation. Normal values and factors associated. *Endothelium*. 2001; 8(2):157-166.
11. Blankenberg S, Tiret L, Bickel C, Peetz D, Cambien F. Interleukin 18 is a strong predictor of cardiovascular death in unstable and stable angina. *Circulation*. 2002;106:24-30.
12. Abcam. Interleukin-18 binding protein human Elisa kit. Version. 2016; 4: 1- 18.
13. Dalekos GN, Elisaf M, Bairaktari E, Tsolas O, Siamopoulos KC. Increased serum levels of interleukin-1beta in the systemic circulation of patients with essential hypertension: additional risk factor for atherogenesis in hypertensive patients? *Journal of Laboratory Clinical Medicine*. 1997; 129: 300-308.
14. Rabkin SW. The role of interleukin 18 in the pathogenesis of hypertension-induced vascular disease. *Nature clinical practice cardiovascular medicine*. 2009; 6:192-199.

15. Kapoor S, Tyangi S. Fatness, fat patterns and changing body dimensions with age in adults males of a high altitude population. *In science of man in the service of man*. 2002; 8:126-139.
16. Tandon K. Obesity, its distribution pattern and health implications among khatri population. *Journal of medical anthropology*. 2006; 41:234-240.
17. Shanthrani CS, Pradeepa R, Deepa R, Saroja R, Premalatha G. Prevalence and risk factors of hypertension in selected South Indian population. *Journal association of physicians*. 2006; 51:20-27.
18. Doll S, Paccaud F, Bovet P, Burnier M, Wietlisbach V. Body mass index, abdominal adiposity and blood pressure: Consistency of their association across developing and developed countries. *International Journal of obesity related metabolic disorder*. 2002; 26:48-57.
19. Bose K, Ghosh A, Roy S, Gangopadhyay S. Blood pressure and waist circumference: An empirical study of the effects of waist circumference on blood pressure among Bengalee workers of Belur, West India. *Journal of physiology anthropology applied human science*. 2003; 22: 169-173.
20. Jan K, Anderson G, Narain K. Hypertension in the native rural population of Assam. *National medical journal of India*. 2005; 17:300-304.
21. The systolic hypertension in the elderly program cooperative research group. Prevention of stroke by antihypertensive drug treatment in older persons with isolated systolic hypertension: final results of SHEP. *JAMA*. 1991; 265:3255-3264.
22. Medical Research Council (MRC) working party. Trial of treatment of hypertension in older adults: principal results. *Brochure Medical journal*. 2009; 304:405-416.
23. Elisabete P. Blood pressure and ageing. *Postgraduate medical journal*. 2007; 83(976):109-114.

How to cite this article:

Oluboyo, A.O, Zaruq, A.O Oluboyo, B.O, Onyeaghala, A.A, Olayanju A.J. *Assessment Of Serum Interleukin-18 And Some Markers Of Hypertension*. *Br J Bio Med Res* , Vol.02, Issue 04, Pg.420-425, July - August 2018. ISSN:2456-9739 Cross Ref DOI : <https://doi.org/10.24942/bjbm.2018.281>

Source of Support: Nil

Conflict of Interest: None declared.

Your next submission with **British BioMedicine Publishers** will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats (Pdf, E-pub, Full Text)
- Unceasing customer service
- Immediate, unrestricted online access
- Global archiving of articles



Track the below URL for one-step submission

<http://www.britishbiomedicine.com/manuscript-submission.aspx>