LITERATURE

# Interpersonal Difference in Blood Pressure in Stroke Patients 

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#### Abstract

The objective of the study was to find a relationship between stroke and interpersonal differences in blood pressure (BP) between both arms. We selected 100 patients with new stroke whom admitted to the hospital or visit the outpatient department, we checked blood pressure in both brachial arteries and we look for significant difference between the left and right arm, the significance of the difference in blood pressure is defined as equal or more than ten-millimeter mercury difference between both arms. There were 49 patients out of 100 patient had a difference in blood pressure which higher than expected in general population which is about 10$20 \%$, also it was a high percentage of them had systemic hypertension, smoking had a positive relationship, while the relation of diabetes and the age of the patient had non-significant relationships.


Keywords: Blood pressure; Interpersonal blood pressure; Right and left arm pressure
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## Introduction

As hypertension is a significant and growing risk factor of early deaths worldwide, proper importance should be given on the accuracy of BP measurement [1,2]. According to American hypertension society guidelines 2017, it is important to check both upper limb blood pressure at the first visit in orderto exclude any difference in the blood pressure in both hand, asymmetric of blood pressure is define as a difference of systolic or diastolic blood pressure more than 10 mmHg , Inter-arm BP difference (IAD) is not only a useful marker for subclavian artery stenos is but also a predicator for increased cardiovascular morbidity and mortality $[3,4]$.

## Methods

The patient admitted to an emergency unit or private clinic with a diagnosis of new stroke were taken, the patient and or the close relative were informed on the study type and once they agreed the study takes approval from ethic committee in College of Medicine, Ninevah University. This was a retrospective observational study. Candidates for this study were patients with acute cerebral infarction or TIA who presented to the Al-Salam hospital and our private clinic between July 2018 and October 2019. Stroke is defined as focal Neurological deficit which either ischemic or hemorrhagic, TIA was diagnosed when a patient had transient focal neurological deficit less than 24 h . The patients were treated according to guidelines of American association of Neurology.

## Measurement of blood pressures

We measurer the blood pressure of all patient in both brachial
arteries using mercury sphygmomanometer, according to American college of cardiology guideline for hypertension in 2017, the first visit should be checked in both brachial artery pressure are measured. The patient who selected were of both sex, some of them are hypertensive, smoker and diabetic. we measure low density lipoprotein as disturbed in the table (Table 1).

## Statistical Analysis

Chi-square test is an important method for determining if there
Table 1: Characteristic of patients.

| Table 1: Characteristic of patients. |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Age Mean |  |  |  |  | $\mathbf{5 9}$ |  |
|  | Female | 40 | $40 \%$ |  |  |  |
|  | Male | 60 | $60 \%$ |  |  |  |
|  |  | 47 | $47 \%$ |  |  |  |
| HTN | 75 | $75 \%$ |  |  |  |  |
| Smoker | 24 | $24 \%$ |  |  |  |  |
| LDL STD |  | 42.3 |  |  |  |  |
| LDL mean |  | 99.9 |  |  |  |  |
| HTN | RT |  |  |  |  |  |
| $\leq 120 / 90-70$ | 50 | LT |  |  |  |  |
| $130 / 80-90$ | 12 | 57 |  |  |  |  |
| $140 / 80-100$ | 12 | 11 |  |  |  |  |
| $150 / 80-100$ | 17 | 9 |  |  |  |  |
| $160 / 70-100$ | 5 | 12 |  |  |  |  |
| $170 / 100-110$ | 2 | 2 |  |  |  |  |
| $180 / 110$ | 1 | 5 |  |  |  |  |
| $90 / 60$ | 1 | 2 |  |  |  |  |
| Total | $\mathbf{1 0 0}$ | 2 |  |  |  |  |

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is a relationship between variables, correlation and liner regression were also used to study the relationship between age groups, LDL and blood pressure variables. A P-value of $\leq 0.05$ was considered to denote statistical significance. Micro Soft Excel 2010 was used for statistical analysis. Scatter chart was used to present continuous variables and tables used for categorical data.

## Results

In our study we find that about half of patients i.e., 49 patients out of 100 patients are under study shows the differences in their measures of systolic and or diastolic BP between RT and LT armas shown in table below (Table 2):

As blood pressure measurement is the main part of this study our patient blood pressure the hypertensive patients were 38 patients of total 100 patients disturbed as in table below (Table 3):

The association between smoking and asymmetry of blood pressure is significant association (Table 4).

While the diabetes mellitus association with asymmetry blood pressure is not significant (Table 5).

We try to find relation between age of the patient and(left and right) blood pressure asymmetry but all show non-significant relationships as shown in the figures (Figures 1 and 2).

Table 2: The range differences of the two measures of BP in RT and LT arm.

| Range differences | No. | \% | p-value $^{*}$ |
| :--- | :--- | :--- | :--- |
| 10 | 27 | $55 \%$ | $<.00001$ |
| 20 | 19 | $39 \%$ |  |
| 30 | 1 | $2 \%$ |  |
| 50 | 2 | $4 \%$ |  |
| Total | 49 | $100 \%$ |  |

Where: *The chi-square statistic is 40.388 . The result is significant at $\mathrm{p}<0.05$

Table 3: Distribution of patients according to the measures of BP in RT and LT arm.

| BP | RT | LT | Total | Status | p-value* |
| :--- | :--- | :--- | :--- | :--- | :--- |
| $\leq 120 / 90-70$ | 50 | 57 | 107 | Normal | 0.777668 |
| $130 / 80-90$ | 12 | 11 | 23 | Normal |  |
| $140 / 90-100$ | 12 | 9 | 21 | Hypertension |  |
| $150 / 80-100$ | 17 | 12 | 29 | Hypertension |  |
| $\geq 160 / 70-100$ | 9 | 11 | 20 | Hypertension |  |
| Ht/Total | $\mathbf{3 8} / \mathbf{1 0 0}$ | $\mathbf{3 2 / 1 0 0}$ | $\mathbf{2 0 0}$ | $\mathbf{3 8} / \mathbf{1 0 0}$ |  |
|  |  |  |  |  |  |

Where: *The chi-square statistic is 1.7716 . The result is not significant at $\mathrm{p}<0.05$

Table 4: The risk of smoking in occurrence of Blood pressure difference in both arms.

| Status | Differ | Not Differ | OR (95\%CI) |
| :--- | :---: | :---: | :---: |
| Smoker | 23 | 13 | $2.42(1.0448$ to 5.6262$)$ |
| Non-Smoker | 27 | 37 |  |
| Total | 50 | 50 |  |

Where: *The chi-square statistic is 4.3403 . The p-value is 0.0372 . This result is significant at $\mathrm{p}<0.05$.

Table 5: The risk of DM in occurrence of Blood pressure difference in both arms.

|  | Differ | Not Differ | OR (95\%CI) |
| :--- | :---: | :---: | :---: |
| DM | 23 | 24 | $1(0.4537$ to 2.1831$)$ |
| Non-DM | 26 | 27 |  |
| Total | 49 | 51 |  |

Where: *The chi-square statistic is 0.0001 . The p -value is 0.9904 . This result is not significant at $\mathrm{p}<0.05$.


Figure 1: Liner regression (R2) and correlation of age and BD PR (RT arm), the results of correlation $=0.0668$. (The P -Value is 0.509036 and the result is not significant at $\mathrm{p}<0.05$ ).


Figure 2: Liner regression (R2) and correlation of age and BD PR (LT arm), the results of correlation $=-0.0206$ (The P -Value is 0.838798 and the result is not significant at $\mathrm{p}<0.05$ ).

## Discussion

This study was done in order to find the relationship between asymmetrical blood pressure and incidence of new stroke. The patient number were one hundred, we find $49 \%$ patients of new stroke patient had interpersonal asymmetrical blood pressure while most of the studies shows that interpersonal asymmetrical blood pressure is range from $15-20 \%$ of whole population, In a systematic review, the prevalence of interarm BP difference of 10 mmHg or more (systolic or diastolic) has found to be $19.6 \%$ for systolic and $8.1 \%$ for diastolic BP [5]. Our result is expected to show strong association between interpersonal pressure difference and atherosclerosis as some studies have suggested that the difference is caused byatherosclerotic changes of the large vessels, which gives the IAD aprognostic value as a marker for predicting cardiovascular events [6,7]. As hypertension is major risk factors of stroke $38 \%$ of our patients in the study were hypertensive, most of the studies shows the prevalence of hypertension is between $50-60 \%$ [8]. Which attribute to the small sample we take which reflected on lower number of hypertensions.

The interesting association is between smoking and IAD it shows significant relationship between them as smoking is one of the major risk factors of atherosclerosis as many study shows atherosclerosis and its relationship to the interpersonal blood pressure difference [9,10]. We try to find a relationship between diabetes mellitus and the difference in the blood pressure and the age of the patient and the difference in blood pressure, both parameters were negatively associated with the difference of blood pressure.

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