Available online on 22.12.2021 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

Open Access Full Text Article

Research Article

Estimation of Fibrinogen Level among Ischemic Stroke Patients in Khartoum State-2021

Dania Mohyeldin Bashir Mohamed[1], Nihad Elsadig Babiker *,[1,2,3]

[1] *Faculty of Medical Laboratory Sciences, National University, Sudan*

[2] *Darfur University College, Sudan*

[3] *National Center of Neurological Sciences, Sudan*

Article Info:

Article History:

Received 21 October 2021
Reviewed 11 December 2021
Accepted 17 December 2021
Published 22 December 2021

Cite this article as:

Mohamed DMB, Babiker NE, Estimation of Fibrinogen Level among Ischemic Stroke Patients in Khartoum State-2021, Journal of Drug Delivery and Therapeutics. 2021; 11(6-S):132-139

DOI: http://dx.doi.org/10.22270/jddt.v11i6-S.5258

*Address for Correspondence:

Nihad Elsadig Babiker, Faculty of Medical Laboratory Sciences, National University, Sudan

Abstract

Background: Ischemic stroke is known as rapidly progressing clinical feature of focal disturbance of cerebral function extending for more than 24 hours or leading to death, with no apparent cause other than vascular origin

Material and methods: This was a case control study conducted at the research laboratory of the national center of neurological sciences, Khartoum, Sudan during the period July to November, 2021, and aimed to estimate of fibrinogen level among Sudanese patients with ischemic stroke. 50 patients attending police hospital and diagnosed with IS were selected as case group. In addition to that, apparently healthy individuals with no history of stroke were selected as control group. 1.8 ml of blood samples were collected in sodium citrate anticoagulant container for measurement of fibrinogen level by clauss method in coagulometer device.

Results: For the fibrinogen level the result observed significance increase in the mean of fibrinogen level in case group when compared to control group with ($P \leq 0.05$). However there was insignificance correlation between fibrinogen level and age, gender, family history, hypertension and smoking the P value was (0.350, 0.900, 0.875, 0.378, 0.435, 0.417) respectively.

Conclusion: The study concluded that there was clearly increase in the fibrinogen level in case group when compared to control group. And there was insignificant correlation of fibrinogen level with risk factors (age, gender, smoking, family history, hypertension and diabetes Miletus)

Keywords: Ischemic stroke, fibrinogen level smoking, hypertension and diabetes Miletus

INTRODUCTION

Stroke is known as rapidly progressing clinical feature of focal disturbance of cerebral function extending for more than 24 hours or leading to death, with no apparent cause other than vascular origin. Three months following a stroke, 15-30% of stroke survivors are permanently disabled and 20% require institutional care [1].

Stroke is a head to cause of morbidity and mortality in western populations, with up to 40% of survivors not expected to improve independence from severe disabilities. This equates to an immense financial burden on health systems worldwide. Hence further education is required to inform individuals of the risks to promote secondary prevention strategies in future generations. Stroke is a heterogeneous, multifactorial disease regulated by modifiable and non-modifiable risk factors. [2].

Pathophsiology of all cerebrovascular diseases has their origin in the vessels supplying or draining the brain. Changes in the vessel wall lead to obstruction of blood flow and by interacting with blood constituents they may cause thrombosis and blockade of blood flow in the vessels [3]. Under ischemic conditions, mitochondrial production of ATP ceases and intracellular ATP stores deplete, resulting cell membrane depolarization leading to a large influx of calcium and sodium and an efflux of potassium. Cells in the infarct core are rapidly and irreversibly destroyed by lipolysis, proteolysis, and disaggregation of microtubules due to metabolic failure [4] It is assumed that acute phase response proteins i.e. ferritin, fibrinogen or others play important role in pathogenesis of ischemic stroke because acute cerebral ischemia triggers interleukin-6 release into cerebrospinal fluid and blood, which is a key mediator of acute phase reaction and induces synthesis of acute phase proteins during ischemia [5].

Fibrinogen is an important component of the coagulation cascade, as well as a major determinant of blood viscosity and blood flow. It is a high molecular weight plasma adhesion protein and a biomarker of inflammation. Increased levels of fibrinogen result in changes in blood rheological properties that exacerbate the complications in peripheral blood circulation during stroke [6,7]. Fibrinogen regulates; NF-kappa B activation and expression of inflammatory chemokines in endothelial cells, binding to its integrin receptor on the surface of leucocytes, facilitating chemotactic response, increasing phagocytosis, antibody mediated leucocyte toxicity and delay in apoptosis. As acute phase protein, fibrinogen is up-regulated by cytokines like interleukin-6 and by glucocorticoids. [8]

The role of plasma fibrinogen in determining incidence and severity of stroke has been postulated time and again. It is assumed that acute phase response proteins such fibrinogen play important role in pathogenesis of ischemic stroke because acute cerebral ischemia triggers interleukin-6 release into cerebrospinal fluid and blood, which is a key mediator of acute phase reaction and induces synthesis of acute phase proteins during ischemia. Some researchers identified elevated level of serum ferritin and plasma fibrinogen in acute ischemic stroke [9]. While others found no such benefits of ferritin and fibrinogen testing in acute ischemic stroke [10]. Despite of potential possibility of higher serum ferritin and plasma fibrinogen levels in acute ischemic stroke events and variable results of different studies, this study designed to estimate the levels fibrinogen among ischemic stroke Sudanese patients.

MATERIAL AND METHODS

This was a case control study conducted at the research laboratory of the national center of neurological sciences, Khartoum, Sudan during the period July to November, 2021. All patients attending police hospital and diagnosed with IS during the aforementioned period were included. In addition to that, apparently healthy individuals with no history of stroke were selected as control group. Five ml of the blood was collected from the superficial vein in the antecubital fossa from the study population under sterile condition in trisodium citrate container. Fibrinogen level was estimated by using the coagulometer (Automated Bio Bas). The data was collected using pre-designed structural questionnaire; the demographic and clinical data concerning each participant was obtained from the registry data base office, which included the following information: (Gender, age, smoking and medical history). The laboratory data included hematological results (fibrinogen level). The data that collected from questionnaire and laboratory results was analyzed by statistic package for social sciences SPSS version 23 computerized program. The study was Approved Ethical Committee of the College Medical Laboratory Sciences, National University.

RESULTS

The epidemiological study

This was case-control study conducted at Khartoum state – Sudan from August to October 2021 to estimate the fibrinogen level among Sudanese patients with ischemic storke. 50 patients were used as case and 50 apparently healthy volunteers were used as control. In the case group 70 %were males and 30% were females with minimum age 47 and maximum age 69(mean81.5) while in control group there was 56 % males and 44% females with minimum age 39years and maximum age 70 years(mean 52.8) (Table 1,2). However in the case group the most affected age between 56-60 years (52%) (Table 3)

In addition the frequency of the risk factors; for hypertension there was 94% with hypertension family history there was 16% with familial history of stroke, for diabetes Miletus only about 20% had diabetes Miletus, obesity; no one was obese, considering smoking there were 18% are smoker while 82% are non-smoker.(Table 2)(Figure 1, 2,3 and 4)

Table 1: Frequency of gender among study population

Study population	Gender	Frequency	Percent
Case	Male	36	72.0
	Female	14	28.0
	Total	50	100.0
Control	Male	32	64.0
	Female	18	36.0
	Total	50	100.0

Table 2: frequency of age group among case and control group

Age	N	Minimum	Maximum	Mean	Std. deviation
Cases	**50**	**47.00**	**69.00**	**57.600**	**4.5825**
Control	**50**	**39.00**	**70.00**	**52.8**	**8.6**

Table 3: frequency of age group among case group

		Frequency	Percent
Valid	45-50	3	6.0
	51-55	9	18.0
	56-60	26	52.0
	Above 60	12	24.0
	Total	50	100.0

Table 4: Frequency of family history among case group

	Frequency	Percent
Yes	9	18.0
No	41	82.0
Total	50	100.0

Table 5: Frequency of smoking among case group

	Frequency	Percent
Yes	9	18.0
No	41	82.0
Total	50	100.0

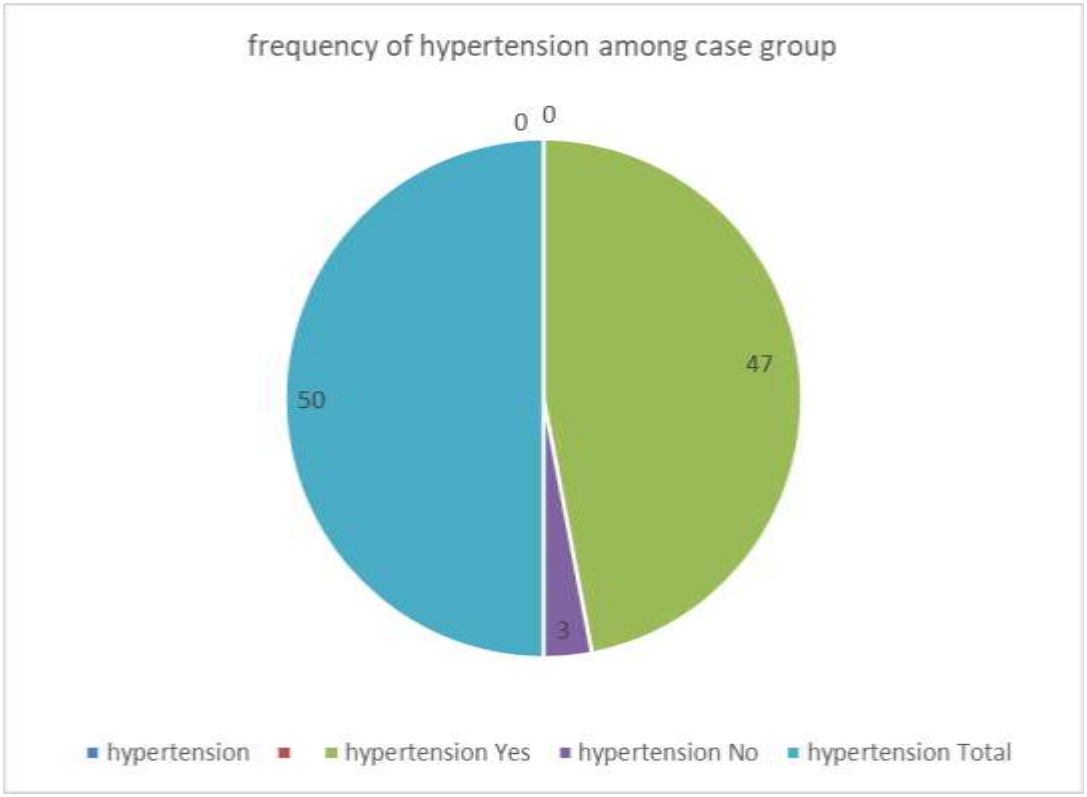

Figure (1): frequency of hypertension among case group

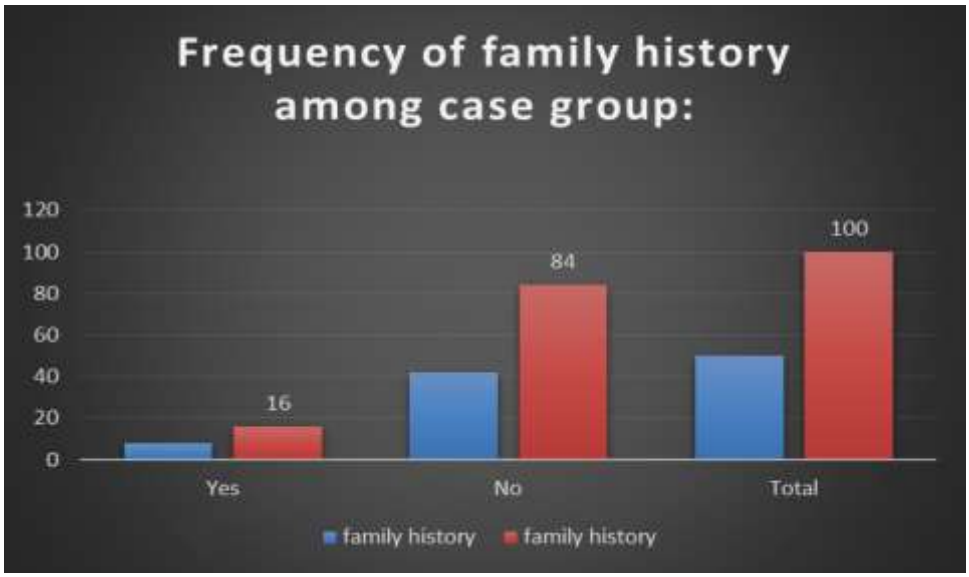

Figure (2): frequency of family history among case group

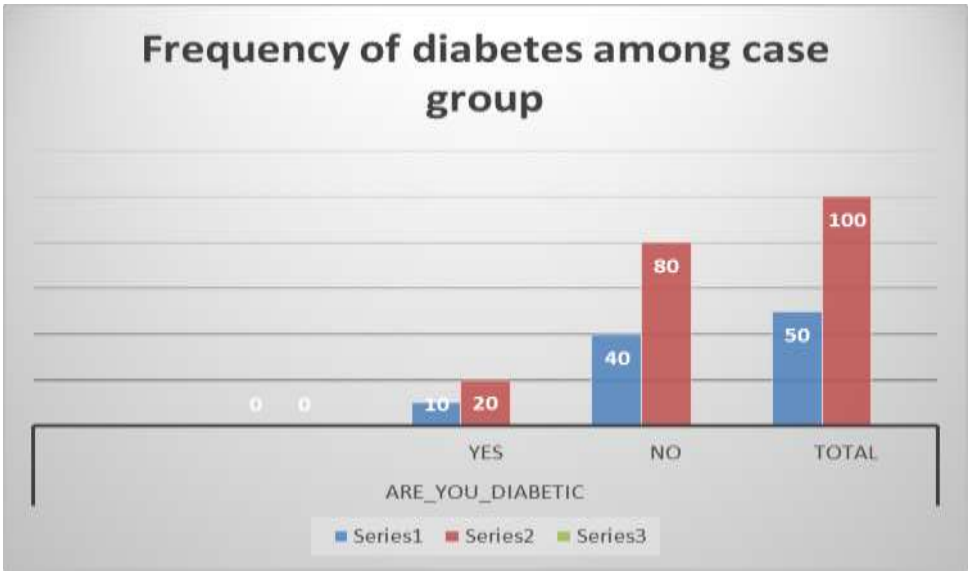

Figure (3): frequency of diabetes among case group

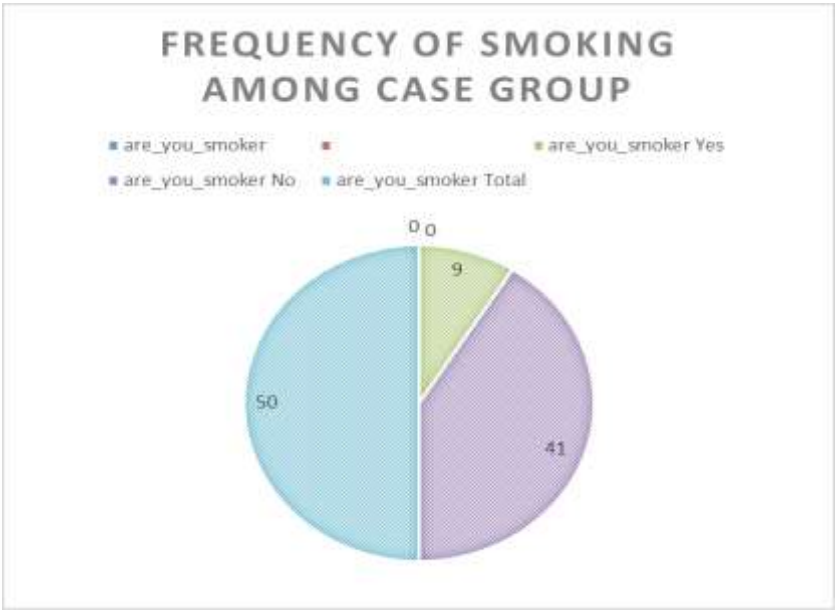

Figure (4): frequency of smoking among case group

The hematological study

For the fibrinogen level the result observed significance increase in the mean of fibrinogen level in case group when compared to control group with (P ≤ 0.05) (table 6). However there was insignificance correlation between fibrinogen level and age, gender, family history, hypertension and smoking the P value was (0.350, 0.900, 0.875, 0.378, 0.435, 0.417) respectively. (Table 7) (fig 5,6,7 and 8).

Table (6) comparison of fibrinogen level between case and control:

	N	Minimum	Maximum	Mean	Std. Deviation	p value
case result	50	349.00	432.00	373.7600	19.18392	
control result	50	177.00	351.00	245.0800	58.78839	0.02

Table 7: correlation between fibrinogen level in case group and risk factors

		age	**gender**	**family history**	**hypertension**	**smoking**	**diabetic**
fibrinogen level	Pearson Correlation	-.135	-.098	-.023	.127	-.113	.117
	P. value	.350	.900	.875	.378	.435	.417
	N	50	50	50	50	50	50
	**. Correlation was significant at the 0.01 level (2-tailed).						

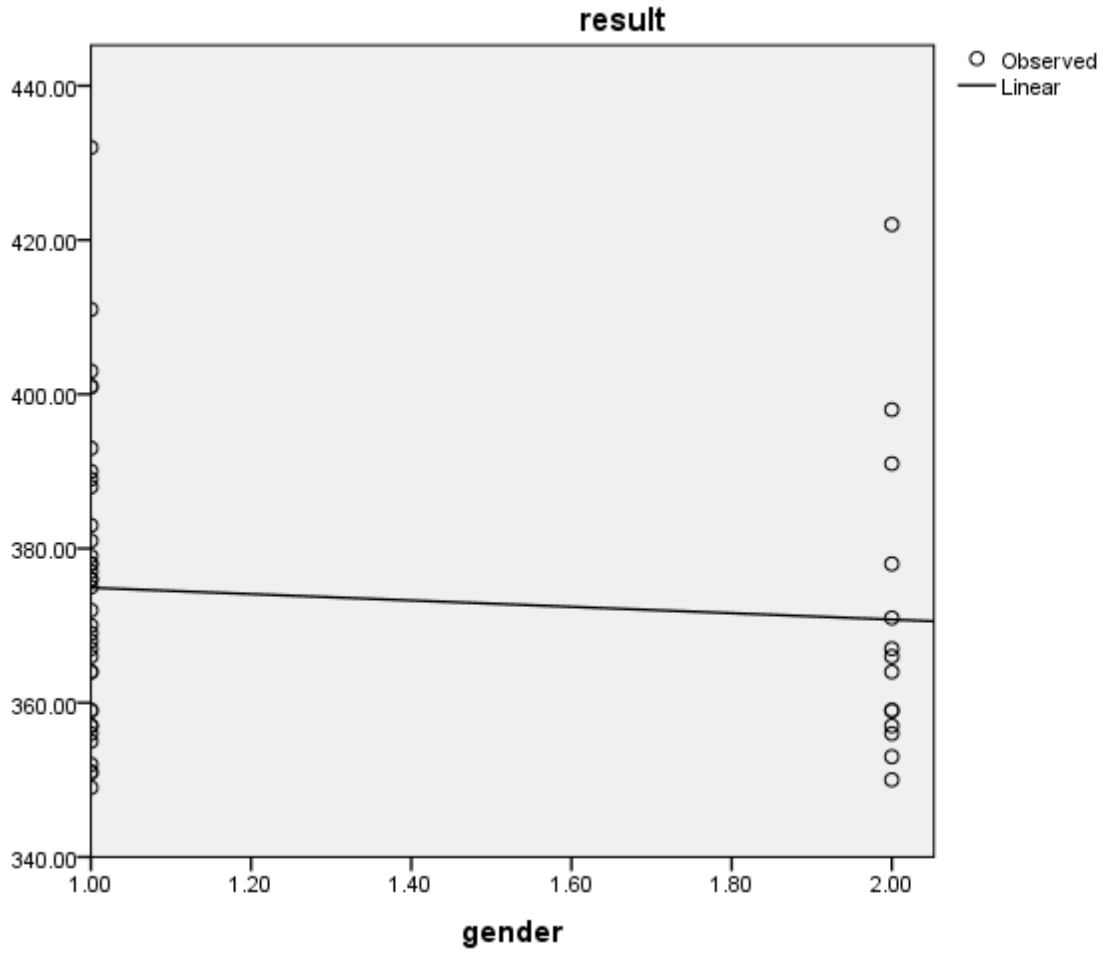

Figure (5): Correlation between result and age

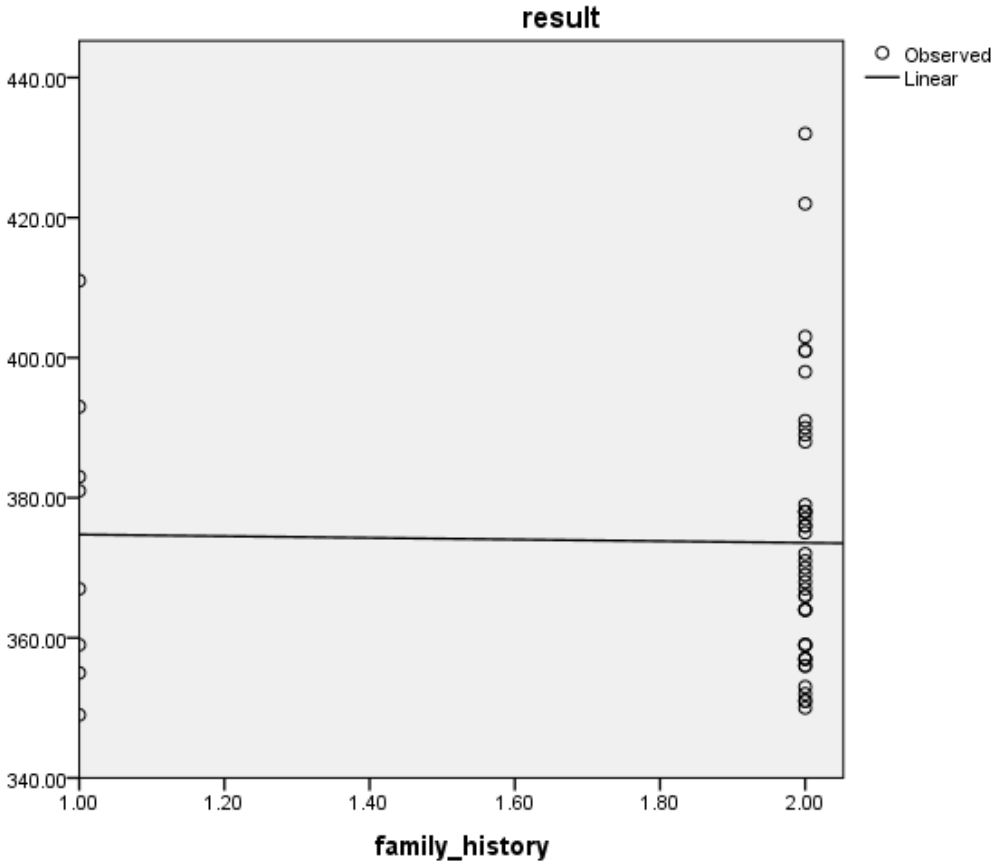

Figure (6): Correlation between fibrinogen and family history

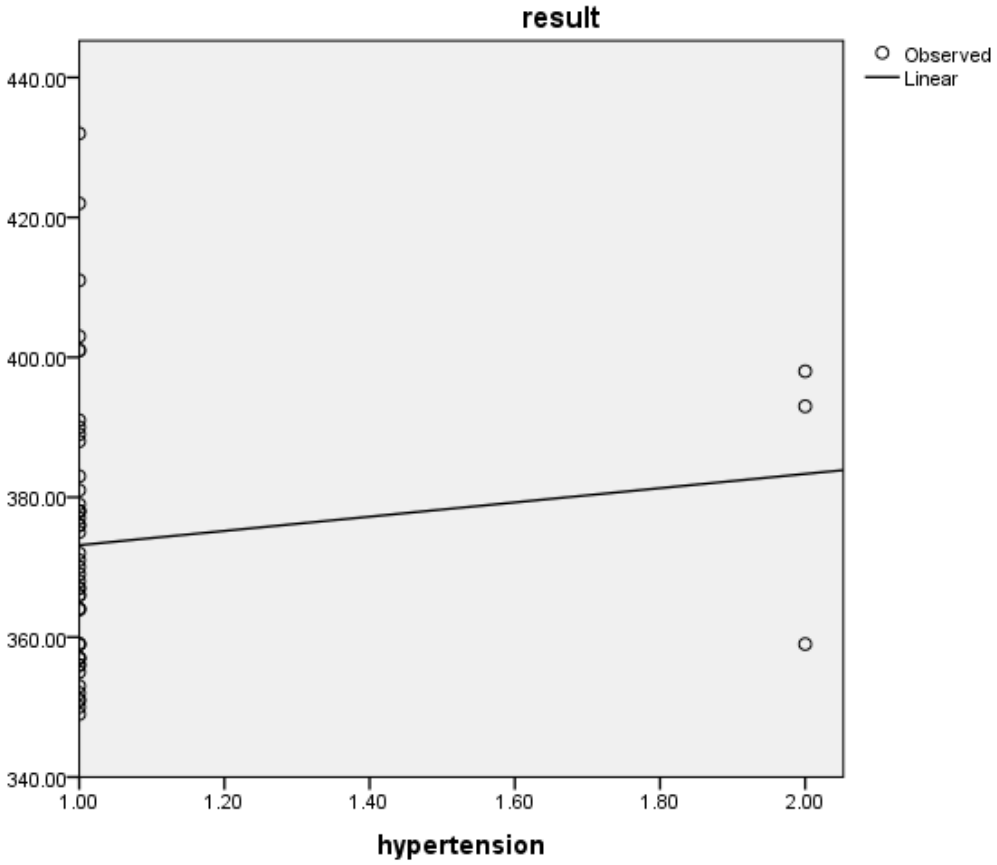

Figure (7): Correlation between fibrinogen and age

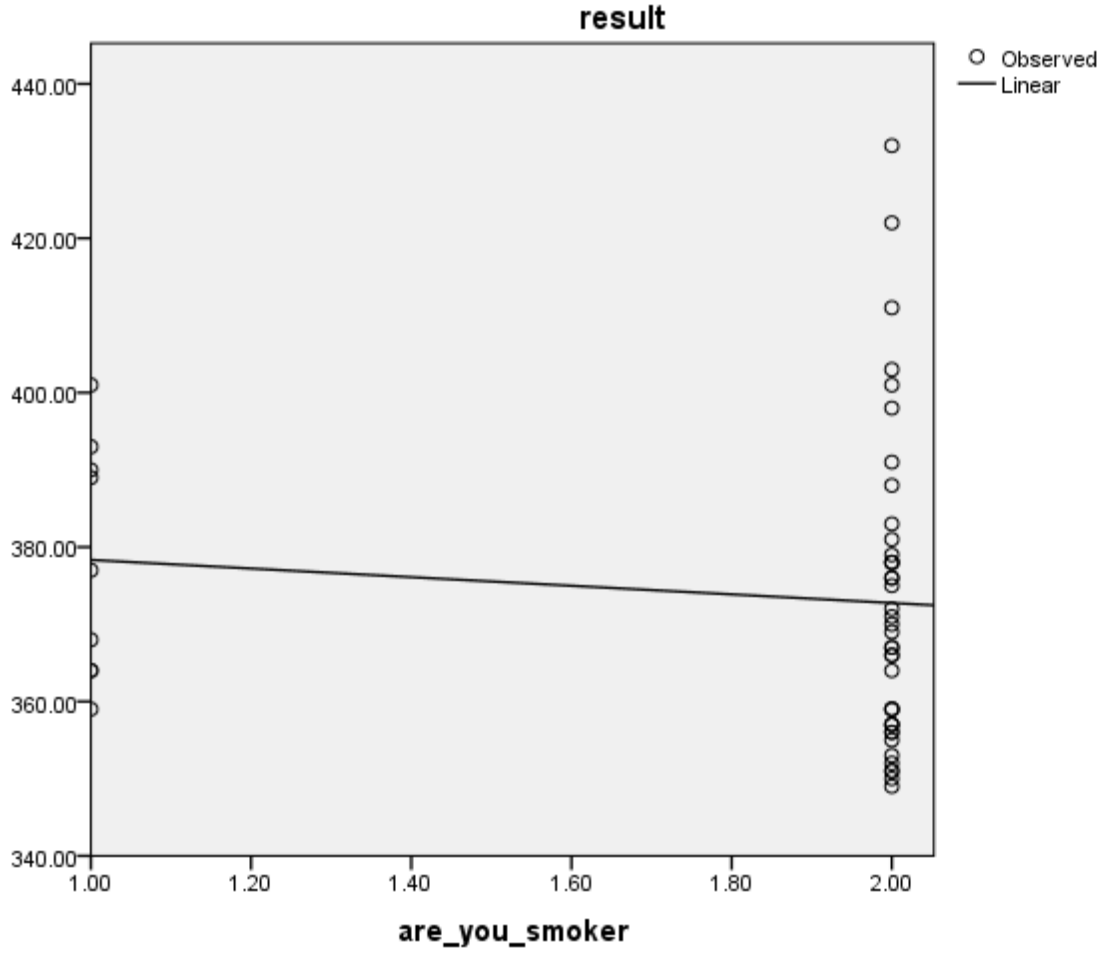

Figure (8): Correlation between fibrinogen and age

DISCUSSION

Several researches have examined the relationship between fibrinogen and stroke, on the fields of whether high levels of fibrinogen are related to the prevalence and mortality of stroke. [11.]

In the present study when compared between the fibrinogen levels among cases and controls the result revealed significant differences with p value ≤0.05, this finding was similar with studies conducted by Perumalla V K et al which reported; the fibrinogen level increased in case group when compared to control group Also Pikija S et al observed increased in fibrinogen level in ischemic stroke patient [12.] In addition to that results Marta Swarowska et al said; fibrinogen level increased in case with ischemic stroke patients when compared with the control group. [13]

Our study show that the frequency of males are greater than the females also genders of the patient have no effect on the fibrinogen level, both sexes has same level of fibrinogen. This agree with the finding of Pikija S et al who concluded; the level of fibrinogen was the same in the both sex among ischemic stroke patients [12]. Also Marta S et al reported the same result, they observed increasing in the level of fibrinogen in both gender. [13]

In this study the cases with hypertension their frequency were 94% and there was insignificant correlation when compared with the fibrinogen level. This results disagree with several studies had shown fibrinogen levels are higher in hypertensive [12,13] ·Furthermore in our results the most affected age group was between (56-60), although when the age correlated with the fibrinogen level there was insignificant association. This disagrees with Marieta P, et al whom concluded the most effect level of fibrinogen according to age was group age above 70. [14]

Considering obesity there was no obese in the study population so this factor was not affected in this study, this result was disagree with Marieta P et al and Marta S et who concluded that obesity could affect in the fibrinogen level .[14]

Regarding the diabetes mellitus there was 20 % case are diabetic which represent one of the risk factor that can affect the increase of fibrinogen level .This was agree with Marieta P et al, Barazzoni R et al and Ernst E which reported; the diabetes is one of the main risk factors that can affect in fibrinogen level in the ischemic stroke patients [9,10]

For the smoking the study observed there was 19% were smoker, smoking consider one of the risk factor that can increased fibrinogen levels , this result was agree also with Ernst E. and Marieta P, et al which conclude that smoking was one of the factor that increase the level of fibrinogen[14]

Based on family history a 16 % of case group with familial history, this observed that family history could be one of the risk factor that can affect the level of fibrinogen. This was agree with Barazzoni R et al and Ernst E. they observed that familial history can be considered as one of the risk factors

that is related with elevated fibrinogen levels in ischemic stroke patients [9,10]

CONCLUSION

The study concluded that there was increase in the mean of fibrinogen level in case group when compared to control group. And there was insignificant correlation of fibrinogen level with risk factors (age, gender, smoking, family history, hypertension and diabetes Miletus). For that the estimation of fibrinogen level should be adopted test for the diagnosis of ischemic stroke in the Sudanese patients.

REFERENCES:

1. Lakhan SE, Kirchgessner A and Hofer M. Inflammatory mechanisms in ischemic stroke: therapeutic approaches. J Transll Med 2009; 7: 97-107. https://doi.org/10.1186/1479-5876-7-97

2. Allen CL, Bayraktutan U. Risk factors for ischaemic stroke. Int J Stroke. 2008; 3(2):105-16. PMID: 18706004. https://doi.org/10.1111/j.1747-4949.2008.00187.x

3. Hossman KA and Heiss WD. Etiology, Pathophysiology and Imaging. Neuropathology and Pathophysiology of stroke. Textbook of Stroke Medicine, 1st Edition 2010, Section-1, Chapter-1, 01-10.

4. Mass MB and Safdieh JE. Ischemic Stroke: Pathophysiology and Principles of Localization. Neurology 2009; 13(1):02-16.

5. Dziedzic T. Clinical significance of acute phase reaction in stroke patients. Front Bio sci 2008; 13:2922-2927. https://doi.org/10.2741/2897

6. HarrisonPM.TheStructureand Functionof Ferritin.BiochemEdu1986; 14(4):154-162. https://doi.org/10.1016/0307-4412(86)90203-7

7. AbdelgawadDM, Elbassiouny AA,Youssef RA, Eldin NS and Elrakawy MH. ElevatedPlasma Fibrinogen Levels Predict Poor Clinical Outcome after Acute Ischemic Stroke. Egypt JNeurolPsych Neurosurg2014; 51(1):61-67.

8. MinnoGD, CerboneA, MargaglioneM,VecchioneG,GrandoneEandManciniM. Fibrnogen and Mechanisms of Thrombosis. ADifficult Link. EuroJEpidemiol 1992; 8:88-91. https://doi.org/10.1007/BF00145357

9. Barazzoni R, Zanetti MG. Kiwanuka DE, Carraro P, Tiengo A, TessariP.Increasedfibrinogen production in type 2 diabetic patients without detectable vascular complications: correlation with plasma glucagon concentrations. The Journal of Clinical Endocrinology and Metabolism 2000; 85:3121-3125. https://doi.org/10.1210/jcem.85.9.6779

10. Ernst E. Regional variations in plasma fibrinogen levels. Ann of internal medicine 1991; 115(4):329-330. https://doi.org/10.7326/0003-4819-115-4-329_2

11- Perumalla V K and Gaddam S R. Estimation of Plasma Fibrinogen Levels in Acute Stroke Patients, JMSCR 2018; 06(10):20-23.

12- Pikija S, Trkulja V, Mutzenbach JS, et al. Fibrinogen consumption is related to intracranial clot burden in acute ischemic stroke: a retrospective hyperdense artery study. J. Transl. Med 2016; 14(1):250 https://doi.org/10.1186/s12967-016-1006-6

13- Marta Swarowska, Aleksandra JanowskaAgnieszkaPolczak, Aleksandra KlimkowiczMrowiec, Joanna Pera, Agnieszka Slowik and Tomasz Dziedzic. The Sustained Increase of Plasma Fibrinogen During Ischemic Stroke Predicts Worse Outcome Independently of Baseline Fibrinogen Level. Inflammation. 2014; 37(4):1142-1147 https://doi.org/10.1007/s10753-014-9838-9

14- Marieta P, Tanya D, ZahariZ,The role of fibrinogen in acute ischaemic stroke Polish Journal of Neurology and Neurosurgery 2021; 55(1):74-80. DOI: 10.5603/PJNNS.a2020.0094 https://doi.org/10.5603/PJNNS.a2020.0094