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Pattern of lipid profile in stroke patients

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Abstract
Stroke is notoriously difficult to treat and the ability to forecast stroke is critical but has been challenging making the detailed study of predisposing factor essential. There is good evidence that modification of risk factors will reduced the risk of stroke. The aim was to determined the serum lipid profile in sample of patients with stroke between age (50-75) years. The study was conducted at the department of neurological at Ibn-Sina Teaching hospital in Mosul City, It receive cases either directly from their consultation unit or referral cases from primary care unit (PHCS) which distributed throughout Mosul city. The type of stroke (ischemia or infarction)must be considered when studying association between blood lipid and occurrence of stroke. Elevated level of total cholesterol, LDL and triglyceride are associated with occurrence of cerebral infarction. The lower total cholesterol level among patient with cerebral hemorrhage in compare to patient with cerebral infarction have been found.

Keywords: stroke, years, patients

Introduction
Stroke is notoriously difficult to treat and the ability to forecast stroke is critical but has been challenging making the detailed study of predisposing factor essential. There is good evidence that modification of risk factors will reduced the risk of stroke [1] The relationship between atherosclerosis and elevated serum lipid is well established and aggressive treatment of dyslipidemia decrease the risk of stroke [1]. Recent studies have shown that distribution of triglycerides and cholesterol within major lipoprotein classes are of the importance for the development of atherosclerosis. Which is the precursor to stroke. Hypercholesterolemia ai a moderate risk factor for stroke. Elevated plasma concenteration of low density lipoprotein (LDL) and low high density lipoprotein are associated with increased risk of atherosclerosis [2]. Stroke is defined as rapidly developing symptoms and/or signs of focal and global loss of cerebral function lasting for at least 24 hours with no apparent cause other than of vascular origin [3].

Epidemiology: Stroke was the second most frequent cause of death worldwide in 2011, accounting for 6.5 million death (11% of the total) [4] Approximately 17 million people had a stroke in 2010 and 33 million people have previously had a stroke and were still alive between 1990 and 2010 the number of stroke decreased approximately by 10% in the developed world and increased by 10% in developing world.[5] Overall two third of stroke 65 years old occurred 1 those over 65 years old .It is ranked after heart disease and before cancer . in united states stroke is a leading cause of disability, and recently declined from third leading to the fourth leading cause of death[6] . Geographic disparities in stroke incidence have been observed including the extended of stroke belt in the southeastern United State, but causes of these disparities have not been explained .The incidence of stroke increases exponentially from 30 years of age, and etiology varies by age .Advanced age is one of the most significant stroke risk factor,95 % of stroke occur in people age 45 and older, and two third of stroke occur in those over age of 65 years [7].

Classification of stroke
Ischemic stroke
In an ischemic stroke, blood supply to part of the brain is decreased, leading to dysfunction in the brain tissue in that area, there are four reasons why this might happen: thrombosis (obstruction of a blood vessels by a blood clot forming locally), embolism (obstruction due to an embolus from elsewhere in the body, see below), systemic hypo perfusion (decrease in the blood supply, e.g. in shock),venous thrombosis [8].

Hemorrhagic stroke
Hemorrhagic stroke involved bleeding within brain, which damages nearby brain tissue, the is very sensitive to bleeding and damage can occur very rapidly .Bleeding irritates the brain tissue, causing swelling .Bleeding collocate into mass called a hematoma .Bleeding also increase pressure on the brain and presses it against the skull [9].

Aim of study
The aim was to determined the serum lipid profile in sample of patients with stroke between age (50-75) years.

Specific objective
1. To evaluate the lipid profile in patients with stroke and compare it with that of control group
2. To compare the serum lipid profile between patients of ischemia and hemorrhagic stroke

Material and methods
Study setting
The study was conducted at the department of neurological at Ibn-Sina Teaching hospital in Mosul City, It receive cases either directly from their consultation unit or referral cases from primary care unit (PHCS) which distributed throughout Mosul city.

Study design
Case control study was adopted in order to achieve the aim

and objective of present study as well as to examine the possible association between changes in the serum lipid profile and occurrence of stroke.

Study period
It has been planned to collect data during six months period from first of October 2013 to the 1st of April 2014.

Study sample
The present study included 100 patients between the age of (50-70) years diagnosed to have CVA, and 100 control subject in the same age group, in whom evaluation proved not to have CVA(history of DM and/HT).

Case definition
We studied 100 consecutive patients with stroke age (50-75) admitted to Ibn-Sina hospital during the period study were diagnosed by specialist neurologist classified as suffering one of stroke subtype (cerebral infarction, intra cerebral hemorrhage).

Exclusion criteria
The patients with any underlying diseases specially liver disease, familial hypercholestermia and hypothyroidism, taking ant lipid and sympathomimetic drugs and the in whom the cerebral infarction was secondary to cerebral tumor, trauma or previous coagulation disorder were excluded from the study.

Control definition
Patients age between (50-75) years that admitted to department of neurological in Ibn-Sina hospital and diagnosed not to have C V A and admitted to the reason other than CVA will be included in this study as a control.
Data collection tool: A questionnaire form was specially prepared in order to collect all the relevant information related to the study sample .

Sample collection of blood
In this study the blood sample were collected from both groups after fasting period for (10-12)hours .A (5) ml of blood from each subject was collected and fasting period (12) hours after 24 hours of stroke attack and measurement of following parameters [14].
Total cholesterol (TC), high density lipoprotein cholesterol (HDL-C),triglyceride(TG),low density lipoprotein cholesterol(LDL-C) by enzymatic methods using kites (Bio-labo) manual procedures by using spectrophotometer.
The normal value for lipid variable used as reference was total cholesterol(TC) less than 5.2 mmol/L Triglyceride (TG) less than 2.3 mmol/L high density lipoprotein cholesterol (HDL) less than 2.59 mmol/L low density lipoprotein cholesterol(LDL) less than1.5mmol/L [10].

Statistical analysis
All the data has been analyzed by use of statistical package ver. 18(Chicago Inc, 111). The sample of study classified into two groups(stroke and healthy control groups) .and stroke group was further sub-classified into (ischemic and hemorrhagic groups).
A 2*2 table were constructed between group of the study and dichotomous data to calculated the Odd ratio, 95% CL (interval estimate of Odd ratio), the significance of these table were assessed by used of Chi square (^{2}) test.
P value ≤ 0.05 was considered significant [11].

Result
[Table 1]. shows the comparison of different parameters of lipid profile results among groups and subgroup of the studies sample . the result reveals that all parameters of lipid profile apart from HDL were significantly higher in stroke group particularly ischemic one in comparison to control group.

Table 1: Comparison of lipid profile in between groups and subgroup of the studies sample.

Lipid profile	Stroke Mean (SD)	Control Mean(SD)	P- Value
Tc	5.14(1.09)	4.47(0.66)	0.001
Tg	1.62(0.49)	1.99(0.48)	0.001
HDL	1.00(0.34)	1.09(0.25)	0.1
LDL	3.38(1.03)	2.49(0.52)	0.001
Lipid profile	Ischemic Mean	Hemorrhage Mean	P-Value
Tc	5.39(88)	4.19(1.31)	0.001
Tg	1.72(0.47)	1.24(0.39)	0.006
HDL	0.99 (0.29)	1.03(52)	0.7
LDL	3.58(0.88)	2.58(1.25)	0.005

After classification of TC, TG, LDL, into above cut- off value as positive and below it as negative, result reveal the following :51% of stroke group have hypercholestermia ;8.1%have high triglyceride ;67.3% have high LDL level . In comparison of the type of stroke regarding their lipid profile reveal the following: 56.4% of ischemic group suffer from hypercholestermia while the percentage was 42..8% in hemorrhagic stroke ;around 10% of both types of stroke have high triglyceride ;76.9% of ischemic stroke group has high LDL while the percentages was 30.3%in hemorrhagic stroke, table 2

Table 2: Comparison of lipid profile after classification into present or absent based on their cut-off value in between group and subgroup of the studies sample

Lipid profile	Stroke	Control	Odd ratio	95%CL	P-value
TC Hyper Normal	50(51%) 48(48.9%)	12(12.2%) 86(87.7%)	7.46	2.68-20.73	0.0001
TG Hyper Normal	8(8.1%) 90(91.8)	14(14.2) 84(85.7%)	0.533	0.146-1.954	0.2
HDL Hyper Normal	86(87.7) 12(12.2%)	92(93.8) 6(6.1%)	0.467	0.110-1.986	0.2
LDL Hyper Normal	66(67.3%) 32(32.6%)	20(20.4%) 78(79.5%)	8.04	3.21-20.10	0.0001
Lipid profile	Ischemic	Hemorrhagic	Odd ratio	95%CL	P-value
TC, Hyper	44(44.8%)	6(6.1%) 14(14.2%)	3.02	0.67-13.44	0.07

Normal	34(34.6%)				
TG Hyper Normal	8(8.1%) 70(71.4%)	2(2.04%) 18(18.3%)	1.02	0.24-10.43	0.3
HDL Hyper Normal	70(71.4%) 8(8.1%)	16(16.32%) 2(2.2.04%)	1.09	0.10-11.15	0.6
LDL Hyper Normal	60(61.2%) 18(18.3%)	6(6.1%) 14(14.25%)	7.778	1.66-36.42	0.008

In[table 3]. The result reveal that 53.06% of the stroke group suffer from dyslipidemia further more dyslipidemia raise the risk of stroke 5 times. The result of comparison of dyslipidemia in between subgroup of stroke reveal more dyslipidemia status in ischemic stroke patients than hemorrhagic stroke patients but the difference statistically not significant.

Table 3: Comparison of dyslipidemia in between groups and subgroup of the studies sample.

Dyslipidemia	Stroke	control	Odd ratio	95%CI	P- value
Hyper	52(53.06%)	18(18.36)	5.02	2.01-12.54	0.0001<
Normal	46(46.93%)	80(81.6%)			
History of dyslipidemia	ischemic	Hemorrhagic	Odd ratio	95%CI	P- value
Hyper	44(44.8%)	8(8.1%)	1.94	0.47-7.98	0.2
Normal	34(34.69%)	12(12.2%)			

Discussion

Stroke makes considerable contribution to morbidity and mortality and is one of the top four causes of death worldwide. The ICH and ischemic infarction are the main causes of cerebra vascular accident. There are several reasons and risk factors influencing the risk of developing strokes. Lipid profile changes are thought to be risk factor in the occurrence of stroke. On other hand, stroke itself is also associated with changes in the lipid levels probably because of the accompanying stress and catecholamine over production that occurs during an acute stroke [12]. Our thesis reveal (51%) of patient with stroke have hypercholestermia, (67.3%) have high LDL, (81.1) have a high TG in comparison to control among the study population. In comparison between cerebral infarction and hemorrhage, the maximum percentage of patient with of hypercholestermia was among patient suffering from cerebral infarction (56.4), around (10%) have high TG. These values are close to the results obtained by other researchers, we have found a case and control studies carried out in China at 2005, which which obtained similar result: cerebral infarction patients had significantly higher level of total cholesterol (78%), LDL (66%) and triglyceride (12%) than those in control group. Furthermore, cerebral hemorrhage subjects exhibited significantly have high level of total cholesterol (60%) and LDL ((69%) [13]**.** A study (case-control) conducted in Italy by on 250 sample showed a higher percentage of cholesterol (60%) in comparison to control and high percentage of LDL (79%) while result of HDL and TG was not significant [14]. In a case control study of 4,989 individuals Japanese age 55-79 years, found significantly association between high LDL, cholesterol level and increased risk of stroke [15]. In these study the percentages of patients with high level of TC in cerebral infarction was 65% and the percentage of high LDL was 68% compare to control, while TG was low among the patient of this study. A study on 200 cases in Iran at 2010 found a great association between elevated lipid profile and development of stroke, the percentage of hypercholestermia among stroke patient was 77%, LDL 55% and elevated TC in comparison with control. Similar result was showed by other intervention study involving 100 patient aged 45-74 years followed up for 5 years found that the percentage of hypercholestermia was 59% and LDL 55% [16].

Conclusion

1. The type of stroke (ischemia or infarction) must be considered when studying association between blood lipid and occurrence of stroke.
2. Elevated level of total cholesterol, LDL and triglyceride are associated with occurrence of cerebral infarction.
3. The lower total cholesterol level among patient with cerebral hemorrhage in compare to patient with cerebral infarction have been found.

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