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Does Corona Pandemic Affect the Epidemiological and Clinical Characteristics of Ischemic Stroke?

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ABSTRACT

COVID-19 is caused by the novel SARS-CoV-2 that has disseminated in a global pandemic. During this pandemic, the healthcare seeking of stroke patients faces relentlessly critical challenges, as doctors continue to struggle in uncharted territory because of There are increasing concerns regarding the impact of imposed health care and social restrictions in response to the corona virus disease 2019 (COVID-19) pandemic on the management and care of patients with stroke

Several cohort studies suggest that COVID-19 itself may be a risk factor for developing a vascular event, while raising concerns about increased morbidity and morbidity.

Our objective is to determine the effect of the corona virus on the epidemiological and clinical characteristics of stroke patients.

ARTICLE DETAILS

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INTRODUCTION

Since the COVID-19 pandemic, several studies talk about changes in coagulation caused by the corona virus, which increases the risk of developing cardiovascular events (Mouhamed Yazan Abou-Ismail et al., 2020). People infected with covid-19 are five times more likely to have a stroke (An Xie et al., **2020**). And when there is a COVID-19 infection and stroke, the mortality is tripled, and the prognosis is often very poor. (An Xie et al., **2020**)

To understand the effects of the COVID-19 pandemic on the epidemiological and clinical characteristics of stroke, we studied the total number of strokes, comorbidities of patients with stroke and mortality of stroke patients in our region for two periods (pre-COVID-19 and during COVID-19).

METHODS

This is an observational comparative study carried out over a period of 2 years. We separated the period into two parts: a pre-COVID period (2018) and a during-COVID period (2020).

We collected demographic data including age, sex and clinical characteristics of patients to assess severity (co-morbidity, National Institutes of Health Stroke Score (NIHSS)) as well as radiological characteristics (carotid imaging and ultra sound results).

The severity of stroke was based on NIHSS scale and we defined as mild (NIHSS= 1-4), moderate (NIHSS=5-15), moderate to severe (NIHSS=16-20) or severe (NIHSS=21-42).

Then we classify according to imagery the vascular territory, the localization of stroke (anterior circulation, posterior circulation, hemorrhagic stroke, multiples localization, or missing)

According to the result of ultrasound carotid, we classify the stroke patient as (with carotid stenosis or no carotid stenosis)

The distribution of stroke subtypes was according to the TOAST classification (cardio-embolism, large artery atherosclerosis, small artery occlusion, other determined etiologies, or undetermined etiologies).

The anterior use of anti-platelets, or anticoagulants, and the length of stay on ICU admission was also compared between populations of the two periods.

The anterior contact with covid-19 was also noted in the During-covid-19 period.

During this study, we compared these characteristics between patients admitted with stroke diagnosis during the COVID-19 pandemic (During COVID -19) and those admitted with the same diagnosis before the pandemic in our hospital (pre- covid19).

RESULTS

We collect a total of (114) patient. Pre-COVID-19 Patients are 56 patients, During-COVID-19 are 58 patients.

The total number of patients discharged with stroke diagnosis from January

Through December 2018 and were compared to the equivalent months in 2020 is illustrated in the following figure (Fig 1).

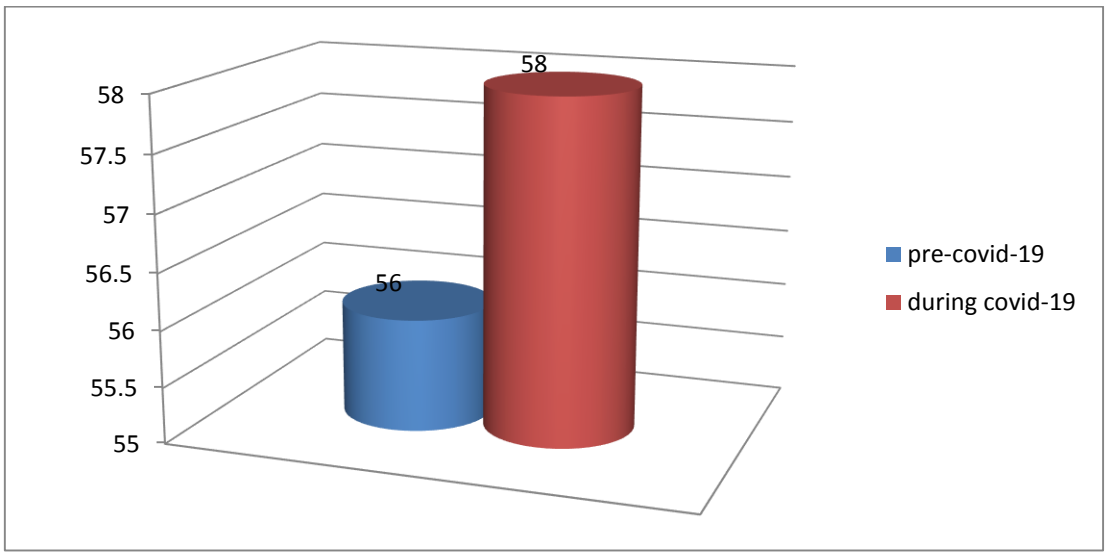

Fig 1. Total number of patients discharged with stroke diagnosis

The Following figure demonstrates the gender distribution of patients in each period. (figure 2)

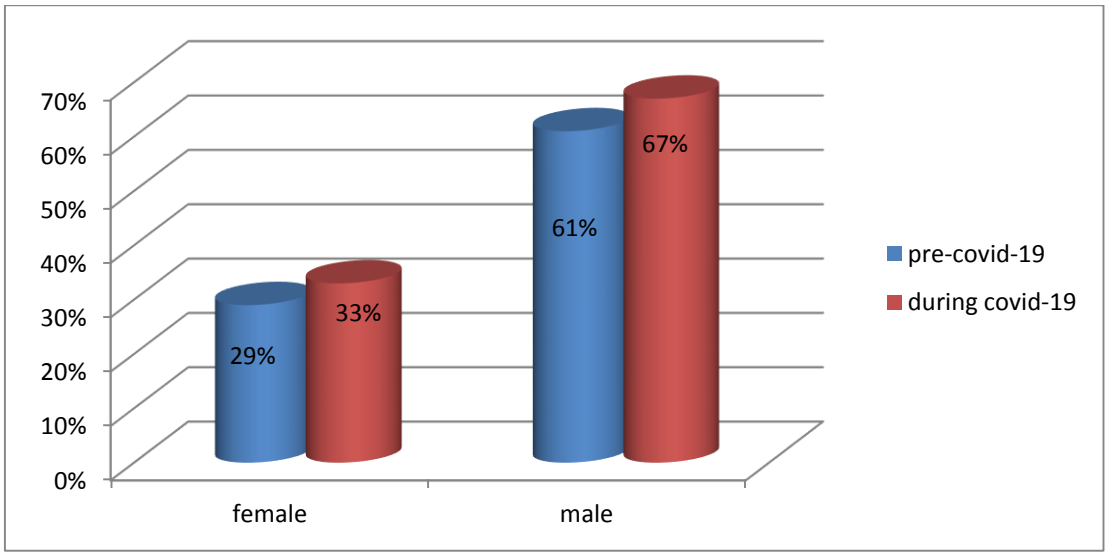

Fig 2. Gender distribution of patients during the two periods.

In our population study, the age of onset was younger in the During COVID-19 patient. We have 3.44% (2 patients) have less than 40years old. 25.87% of During COVID-19 patients are between 51-60 years. 34.48% are less then 60years olds in the During COVID-19 period vs 21.42% in the Pre-COVID-19 period (Table 1).

Age range	Pre-Covid-19, n (%)	During COVID-19 n (%)
<30	0	0
30-40	0	2 (3.44)
41-50	2 (3.57)	3 (5.17)
51-60	10 (17.85)	15(25.87)
61-70	17 (30.35)	18 (31.03)
>70	27 (48.21)	20 (34.48)

Table 1. Age distribution during the two periods

Co morbidities during the two periods are summarized in the following graph (figure 4).

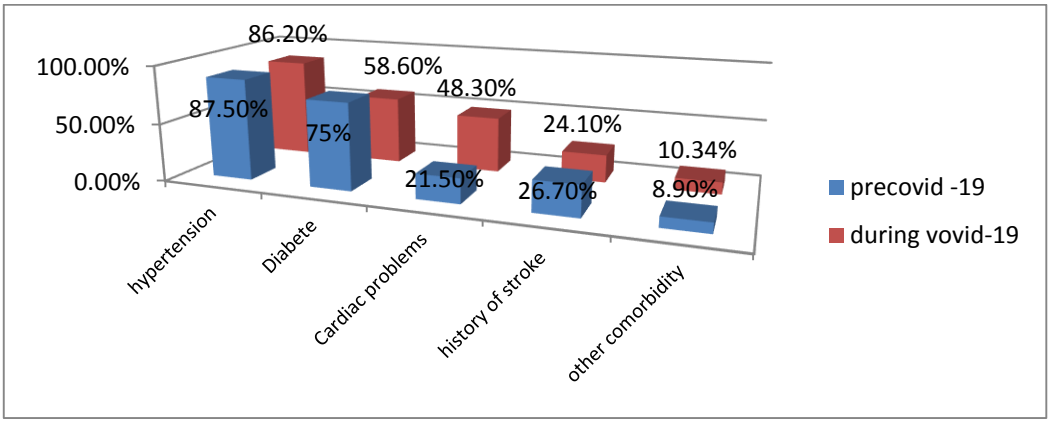

Fig 4. associated comorbidities of patients

The median of NIHSS during the pre-covid-19 period was 9.6 (1-21). Durig covid-19 median of NIHSS was 10.47 (1-22).The severity of stroke was evaluated by NIHSS scale and the result is summarized in the folloing diagram. (figure 5).

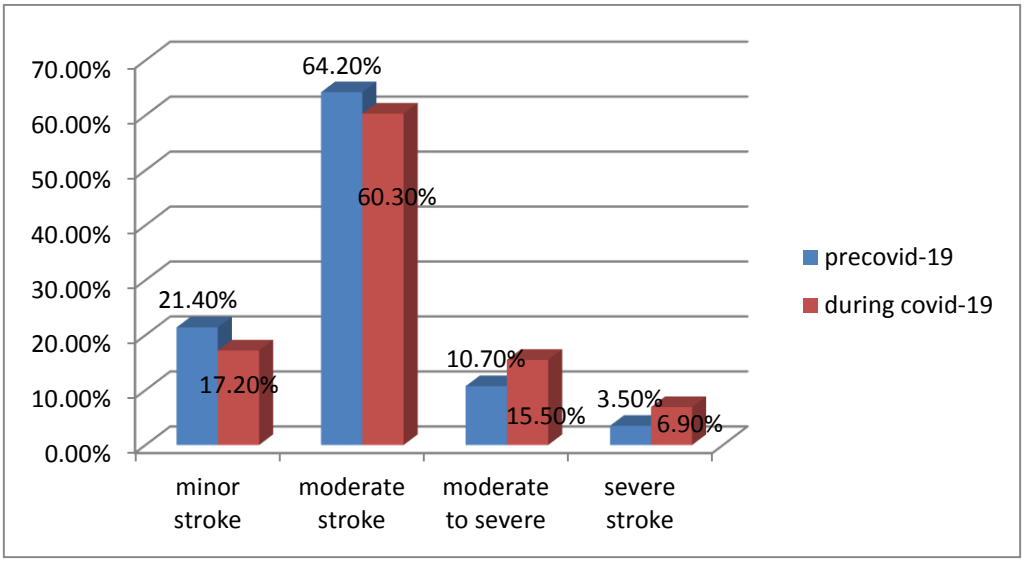

Fig 5. severity of stroke.

The distribution of stroke subtypes according to the TOAST classification was summarized in the following diagram. Large artery atherosclerosis (14.3%) in the precovid-19 period versus (vs) (8.6%) During COVID-19 period, cardio Embolism (17.9% vs. 48.2%), small vessel occlusion (73.2% vs. 27.58%), other determined etiology (1.8% vs1.7 %), and undetermined etiology (5.3% vs. 13.7%). (Fig 6)

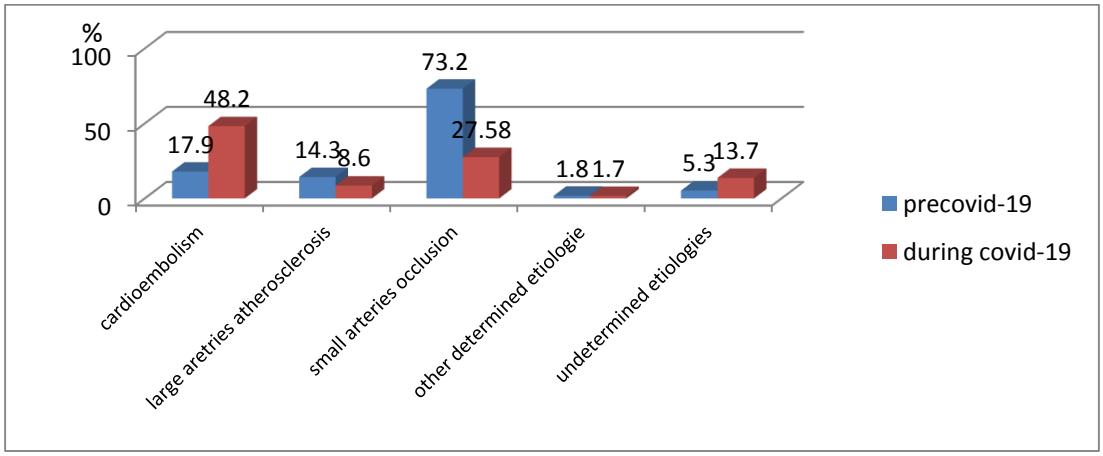

Fig 6. Stroke subtypes according to the TOAST classification

The baseline of epidemiologic characteristics and comorbidities of stroke patients during the two period (pre-covid19, during covid-19) is regrouped in the following table (table 2)

Table 2. epidemiologic characteristics and comorbidities of stroke patients

		Precovid-19	During covid-19
Total number of stroke patients		56	58
Age	<55	11%	13%
	>55	89%	87%
Gender	female	(22) 39.2%	(18) 31.03%
	male	(34) 60.7%	(39) 67.24%
comorbidity	hypertension	87.5%	86.2%
	diabete	75%	58.6%
	Cardiac problems	21.5%	48.3%
	Prior history of stroke	26.7%	24.1%
	others	8.9%	10.34%
Prior antiplatelet therapy, (%)		26.79%	24.3%
Prior anticoagulant therapy, (%)		8.9%	12.06%
SARS-CoV-2 infection at the time of admission (%)			3.44%
History of contact with SARS-COV-2			57.58%
SARS-CoV-2 to stroke interval			5±7days

Vascular territories as foundered in imagery are summarized in the following table (table 3)

Table 3. Vascular territory repartition

Vascular territory		**Precovid-19**	**During covid-19**
Anterior circulation	MCA	30 (53.7%)	32 (55.2%)
	ACA	10 (17.8%)	1(1.72%)
Posterior circulation	PCA	6 (10.8%)	13 (22.41%)
	PICA	1 (1.7%)	0 (0%)
Hemorrghic stroke		1 (1.7%)	3 (5.17%)
Multiples localisations		3 (5.4%)	2 (3.44%)
Missing		5 (8.9%)	7 (12.06%)
Total		56	58

*MCA: middle cerebral artery, ACA: anterior cerebral artery, PCA: posterior cerebral artery, PICA: Posterior inferior cerebellar artery

Limbs paresis is the most frequent symptoms with onset sign in our population study during the 2 periods. The other symptoms are sumarised in the following table(table 4)

Table 4. symptoms of onset

Symptoms of onset			**Precovid-19**	**During covid-19**
Limb paresis	Right side		16 (30.35%)	20 (34.48%)
	Left side		19 (33.9%)	16 (27.58%)
Sensory loss	Right side		17 (30.35%)	10 (17.24%)
	Left side		5 (9%)	7 (12.06%)
Visuel field loss	Right side		2 (3.6%)	8 (13.8%)
	Left side		0	1(1.7%)
Ataxia	static		1(1.78%)	2 (3.44%)
	cinetic	Right side	3 (5.35%)	10 (17.24%)
		Left side	0	3 (5.17%)
Language disturbance	Aphasia		10 (17.8%)	17 (29.31%)
	dysarthria		3 (5.35%)	9 (15.51%)
Seizure			1 (1.78%)	2 (3.44%)
Altered level of consiousness			3 (5.35%)	7 (12.06%)

During the first period the length of stay of the majority of patients did not exceed 5 days (62.5%) with a median 6.8 (3-30 days) on the other hand, the median of length of stay during the second period were 7.3 (3-30days) with 43.37% were admitted for a period less than 5 days.

The details of length of stay and ICU admission are summarized in the following table(table 5)

Table 5. length of stay and ICU admission

		Pre covid-19, n (%)	During covid-19, n (%)
Length of stay	<5	35 (62.5%)	24 (43.37%
	6-10	18(32.14%)	24(41.37%)
	10-30	3(5.37%)	10 (17.24%)
ICU admission		4 (7.14%)	16(27.58%)
Died patients		1(1.78%)	1(1.72%)
Median of length of stay during period		6.8 (3-30)	7.3(3-30)

DISCUSSION

In the present study , we recorded that there was no change in the rate of ischemic stroke admission between the two periods. This outcome was inconsistent with several other studies that reported a reduction of stroke cases during the pandemic (Paliwal et al., 2020).

We report that During COVID-19 period patients appear to be slitely more yonger than the pre-COVID -19 patients . Five patients are less than 50 years with two patients are less than 40 years with no cardiovascular risk factors. These findings are in concordance with A multicentre series which reported that 27% were younger than 50 years (Oxley TJ et al., 2019; Sweid A et al., 2019).

Additionally, the report stated that these patients present with more severe stroke syndrome and two of the 15 patients with large vessel stroke were younger than 50 years and without previous stroke risk factors. (Sweid A et al., 2019)

In our study, COVID-19 screening was performed in patients with a history of fever or respiratory symptoms. Only 3.44% had a positive test at the time of stroke. and 57.58% were in contact with covid-19 before the stroke occurred (5±7days).

It has been very well documented that a significant proportion of patients with COVID-19 can have very mild symptoms or even be asymptomatic and that the sensitivity of COVID-19 tests can also vary.Therefore, it becomes evident that the reported ischemic stroke rates in COVID-19 patients should still be interpreted with some criticism.(Wacharapluesadee S et al., 2020),

The appearance of neurological symptoms after previous contact with covid-19 has been described by several studies. In one study, very heterogeneous neurological symptoms are present in (56%) in COVID-19 and they noted that cerebrovascular disease usually develops later, after the first 2 weeks with a median of 6 days in ischemic stroke.(Richard J Perry et al., 2021)

According to our study, we notice a slight cardio-embolic predominance in the distribution of stroke subtypes according to the TOAST classification. But according to a large study conducted in England and Scotland at 13 centers, no single etiological category of ischemic stroke appears to have been more strongly associated with COVID-19 infection than others and it suggests that COVID-19 can cause the onset of ischemic stroke through a variety of thrombotic and inflammatory mechanisms, promoting thrombus generation in the heart (Ford JS et al., 2019), or great vessels or via small vascular occlusion. One of these mechanisms can manifest itself in a given patient depending on his vascular risk factors and his comorbidities, such as atrial fibrillation, atheroma of the great vessels, hypertension or type 2 diabetes mellitus. (Mohamud A Y et al., 2020). Another study talks about a high prevalence of cryptogenic stroke during Covid Period. (Yaghi S et al., 2020).

One other study suggested that stroke symptoms are develpped after the first 2 weeks, secondary to the development of the increased hypercoagulable and inflammation state. (Fara MG et al., 2020).

Our finding that ischaemic stroke during- COVID-19 is more severe than in patients pre- COVID-19 . the median of NIHSS during the precovid-19 period was 9.6 Durig covid-19 the median of NIHSS was 10.47. Also the rate of admission in ICU is high during the second period (27.58% versus 7.14%). Our results are consistent with several other studies, stroke associated with COVID-19 is more severe than in patients without COVID-19. These studies explain the difference by the hypothesis that there is a strong tendency for patients with minor strokes to stay out of hospital during the pandemic, or doctors to avoid admitting them to these studies. . (Perry R et al. 2020; Richard J Perry et al., 2020; Yaghi S et al., 2020).

The findings of two studies of a recent meta- analysis are in accordance with two others studies suggesting that stroke occurrence may increase by 2.5 in those with severe COVID-19, with a trend for increased mortality, but in our study there is no impact of covid-19 on stroke patient mortality. (Aggarwal G et al., 2019; Yaghi S et al., 2020)

In conclusion, the results of our study reveal a relevant impact on the epidemiology and severity of stroke. A high proportion of cardioembolic strokes during the pandemic supports the hypothesis of inflammation-induced hypercoagility and occult cardioembolism in stroke patients during this period, but this hypothesis is not enaugh to explain all types of stroke.

Further investigation is necessary to examine the impact of COVID-19 on stroke morbidity and mortality.

Epidemiological studies looking at the short- and long-term consequences of the pandemic on stroke patients are also needed to assess the effectiveness and efficiency of possible interventions and new policies.

DISCLOSURE

I declare that I have no financial interest or any conflict of interest.

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