



## Prevalence of Disturbed Level of Consciousness in Ischemic Cerebrovascular Stroke Patients Presented to the Emergency Department of Alexandria University Hospital

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### Abstract

A study performed on 122 patients diagnosed with ischemic cerebrovascular stroke presented to the Emergency department of Alexandria University hospital during the period from 1/7/2014 to 31/12/2014 in order to study the prevalence of disturbed level of consciousness in this group of patients. Those patients were subjected to history taking, clinical examination, and assessment of the LOC, laboratory investigations and radiological examination using CT-brain and MRI in selected cases.

The most common risk factors were hypertension then Diabetes Mellitus. Males were more affected than female and the mean age of the patients was 59 years and the mean systolic blood pressures of patients were 144 mm.Hg.

Based on the GCS it was found that 27% of the patients had DLC. The patients were classified according to the severity of the impairment of the LOC into mild (GCS 14-13), Moderate (GCS 12-9) and Severe (GCS 3-8). Mild cases comprised 36.3% , moderate 33.3% and severe 30.3% of DLC patients. 33.3% of the DLC patients were intubated.

The most important CT-brain finding in the DLC patients was MCA infarction that was found in 45.5% of DLC patients. Those patients are more labile to develop brain swelling and haemorrhagic transformation. It was found that 40% of MCA stroke patients were in deep coma.

Infratentorial infarctions also are an important causes for the occurrence of disturbed level of consciousness.

Hypertension is an important risk factor for stroke yet, it was found no significant correlation between hypertension and DLC.

It was found that there was a significant correlation between DLC and the admission hyperglycaemia and hyponatremia. While there was no correlation between raised admission Creatinine level and altered mental status.

**Keywords:** Disturbed level of consciousness , Cerebrovascular stroke , GCS.

### Introduction

Cerebrovascular stroke is the third leading cause of death and a leading cause of long-term

disability. Stroke is defined as any vascular injury that reduces the cerebral blood flow to a specific region in the brain causing a neurological

impairment. Approximately about 87% of strokes are ischemic in nature. Cerebral ischemia is caused by a reduction in blood flow that lasts longer than several seconds. (Wolf et al., 2011) Disturbed level of consciousness is one of the common presentation encountered in the emergency department of cerebrovascular stroke most of these cases are critical and need intensive interventions and specialized unit in stroke care admission, also it increases the burden of stroke mortality. (Hashem et al., 2004). Possible risk factors for development of disturbed sensorium in ischemic stroke patients include: middle cerebral artery infarction, brain oedema (Takagi et al., 1981), haemorrhagic transformation of ischemic stroke (Paciaroni et al., 2008), hyponatraemia (Rodrigues et al., 2014) and hyperglycaemia (Capes et al., 2001)

### Patients

Patients admitted to the emergency department in Alexandria University hospital during the period 1/7/2014 to 31/12/2014 and suspected to have cerebrovascular stroke depending on the clinical data and CT brain.

### Methods

#### Study Design

A prospective study was conducted on patients admitted to the emergency department in Alexandria University hospital during the period 1/7/2014 to 31/12/2014 and suspected to have cerebrovascular stroke depending on the clinical data and CT brain.

#### Tools of data collection

**The patients in the study was subjected to:**

**1-History Taking:** special emphasize on previous cerebrovascular accidents, intoxication, liver diseases, hypertension and diabetes mellitus.

#### 2-Clinical Examination:

Examination of the general condition: Airway, breathing and circulation

Neurological examination: Glasgow coma scale, motor and sensory assessment.

### 3-Investigations

**Laboratory:** Random blood Glucose. Arterial Blood Gases analysis.

Serum Urea and Creatinine. Electrolytes: Sodium and Potassium.

Liver Function tests: Bleeding profile, SGOT and SGPT.

ESR and CRP

CSF analysis in case of suspected meningitis.

**Radiology:** CT-Brain.

MRI brain for selected patients who had their initial CT unremarkable.

**4-Discharge sheet** of all the patients were revised to estimate the mortality rate.

### Statistical Analysis

Data were analyzed using software (SPSS 21)

Descriptive data was expressed in frequency and percent and was analyzed using Chi-square test also exact tests such Fisher exact and Monte Carlo was applied to compare different groups.

P value was assumed to be significant at (0.05) with confidence interval set at 95%.

### Results

During the period from 1/7/2014 to 31/12/2014, 122 ischemic stroke patients were admitted to the emergency department of Alexandria university hospital.

Table 1 shows the demographic characteristic of the ischemic stroke patients admitted to the emergency department where: sixty seven (54.9%) patients were males, fifty five (45.1%) patients were females, and the mean age of the patients was 58 years with SD  $\pm$ 12.

According to the past medical history: fifty five (45.1%) patients were hypertensive, Thirty-six (29.5%) patients were diabetic, eleven patients (9%) were Hepatitis C positive patients and three patients (2.5%) were Intravenous drugs abusers. Table 2: shows the distribution of the ischemic stroke patients according the systolic blood pressure on admission: forty seven patients (38.6%) their systolic blood pressures were between 90 mm.Hg and less than 140 mm.Hg ,

sixty-two patients(50.8%) their systolic blood pressure between 140 mm.Hg and less than 180 mm. Hg and thirteen patients (10.6%) their systolic blood pressure was more than 180 mm.Hg, the mean systolic blood pressure was 144 mm.Hg with standard deviation  $\pm 14$ .

Table 4: shows the different clinical presentations of ischemic stroke presented to the Emergency department: Motor weakness or lag was present in seventy-four patients (60%), dysarthria was present in thirty-six patients (29.5%), dysphasia and aphasia were present in eleven (9%) patients, pure sensory manifestations were present in three patients (2.45%) and disturbed level of consciousness was present in 33 patients (27%). Table 3 reveals the distribution of patients according to the CT-brain findings: 41% of cases had subcortical white matter infarction, 22.1% of cases had basal ganglia infarction, 18.1% of cases

had small cortical infarction, 16.4% of cases had MCA (middle cerebral artery infarction) infarction, 1.6% of cases had pontine infarction and 0.8% of cases had cerebellar infarction. According to the complications of stroke (table 5): five cases presented to the emergency department by brain swelling following ischemic infarction : four cases (3.28%) following MCA infarction and one case (0.82%) following Cerebellar infarction, Two cases of MCA infarction developed haemorrhagic transformation while three cases with non-MCA infarction suffered from early haemorrhagic transformation, One case (0.82%) presented by post-stroke seizures , and three cases (2.45%) had sepsis all three cases had urosepsis. All these cases presented to the emergency department with disturbed level of consciousness.

**Table (1)** Demographic characteristics of ischemic stroke patients in the emergency department of Alexandria university hospitals

	No.	Percent	Mean / SD
<b>Age (year)</b>			58 $\pm$ 12
<b>Sex</b>			
Females	55	45.1	
Males	67	54.9	
<b>Medical History</b>			
Hypertension	55	45.1	
Diabetes Mellitus	36	29.5	
Atrial Fibrillation	8	6.6	
IV drug Abuse	3	2.5	
Hepatitis C positive	11	9	

**Table (2):** The distribution of the patients according to Systolic B.P. on admission

Systolic B.P. mm.Hg	Frequency	Percent
90-<140	47	38.6
140-<180	62	50.8
>180	13	10.6
<b>Total</b>	122	100
<b>Mean S.B.P.</b>	<b>Standard Deviation</b>	
<b>144</b>	<b><math>\pm 24</math></b>	

**Table (3)** Distribution of cases according to initial clinical presentation

Presentation	Number	Percentage %
Motor weakness / Lag	74	60
Dysarthria	36	29.5
Dysphasia/ Aphasia	11	9
Pure Sensory Manifestations	3	2.45
Disturbed level of consciousness	33	27

**Table (4)** Distribution of ischemic stroke patients admitted to the Emergency Department according to the CT-brain finding

CT brain	No.	Percentage
Basal Ganglia Infarction	27	22.1
Cerebellar Infarction	1	0.8
Small Cortical Infarction	22	18.1
MCA infarction	20	16.4
Pontine Infarction	2	1.6
Subcortical White Matter Infarction	50	41.0

**Table (5)** Distribution of ischemic cerebrovascular stroke patients according to complications

	Number	Percentage
Brain swelling following MCA infarction with mid line shift less than 4 mm.	1	0.8
Brain swelling following MCA infarction with mid line shift less than 4 mm.	3	2.45
Haemorrhagic Transformation of MCA infarction	2	1.64
Haemorrhagic transformation of non-MCA infarction	3	2.45
Brain Swelling following cerebellar infarction	1	0.82
Post-stroke seizures	1	0.82
Sepsis following ischemic infarction	3	2.45
<b>Total</b>	<b>11</b>	<b>9</b>

Table 5 shows that 33(27%) patients suffered from disturbed level of consciousness as a presentation of ischemic cerebrovascular stroke in the Emergency Department. Table 6 shows distribution of ischemic cerebrovascular stroke patients admitted to the Emergency Department with disturbed level of consciousness: Eighteen (54.5%) patients were males and fifteen (45.5%) patients were females. The mean age was 59 years with SD  $\pm 15$ . Seven patients (21.2%) aged less than or equal forty-five and twenty-six patients (78.8%) aged more than 45 years. The patients were classified according to the GCS in mild (GCS 14-13), moderate (GCS 12-9) and severe (GCS 8-3) disturbed level of consciousness. Twelve (36.3%) patients had mild disturbed level of consciousness, eleven patients (33.3%) had moderate disturbed level of consciousness and ten (30.3%) patients had severe disturbed level of consciousness. Eleven patients (33.3%) were intubated. The mean Random blood glucose of these patients was 192 mg/dl with SD  $\pm 93.9$ , the mean creatinine level was 1.13 mg/dl with SD  $\pm 0.47$  and the mean sodium level was 131 mmol/l with SD  $\pm 7.7$ .

According to the admission systolic blood pressure (table 7): sixteen patients (48.6%) their systolic blood pressures were between 90 mm.Hg and less than 140 mm.Hg, twelve patients (36.4%) their systolic blood pressures were between 140 mm.Hg and less than 180 mm.Hg and five patients (15.1%) their blood pressures were more than 180 mm.Hg. The mean systolic blood pressure was 141 mm.Hg with standard deviation  $\pm 31$ .

Table 8: shows that 51.1% of the disturbed level of consciousness patients their admission systolic blood pressures were more than 140 mm.Hg and 65% of the non-disturbed level of consciousness patients their admission systolic blood pressure were more than 140 mm.Hg (P-value=0.209), denoting there is no significant correlation between admission hypertension and the development of disturbed level of consciousness. According to the admission Random blood glucose of all cases (table 9) fifty eight patients had random blood glucose level (normal 80-140 mg/dl) more than 140 mg/dl 36.2% of them suffered from disturbed level of consciousness (P value =0.03) which is statistically significant.

According to the admission Creatinine level (table 10) 22 patients (18%) had creatinine level (normal 0.5-1.2 mg/dl) more than 1.2 mg/dl 9% of them had disturbed level of consciousness (P value = 0.106).

According to the admission Sodium level (table 10) (normal 135-145 mmol/l) fifty four (44.3%) patients their Sodium level was less 135 mmol/l 38.9% of them suffered from disturbed level of consciousness, in four patients their Sodium level was more than 145 mmol/l and only one had disturbed level of consciousness (25%). (P value = 0.022) denotes there is a correlation between the Sodium level and the disturbed level of consciousness.

Tables 11,12 show the CT-Brain findings of the disturbed level of consciousness patients:

As it is noted three patients (9%) had infratentorial infarctions (two patients had pontine infarction and one patient had cerebellar infarction) while the remaining thirty patients had supratentorial infarctions: fifteen patients (45.5%) had Middle Cerebral Artery Infarction, nine patients (27.3%) had subcortical white matter infarction, four patients (12%) had basal ganglia

infarction, two patients (6.1%) had cortical infarction

As mentioned before twenty patients had Middle cerebral artery (table 13) infarction 75% of them suffered from disturbed level of consciousness these patients comprises about 45% of the total number of disturbed level of consciousness. (P value < 0.000)

Table (14): shows that all the cases of infratentorial infarctions suffered from disturbed level of consciousness (P value = 0.0039); this shows there is a significant correlation between the infratentorial infarctions and the development of disturbed level of consciousness.

Table (15): Shows the mortality ratio of ischemic stroke patients admitted to the Emergency department, as it noticed three patients from the non-disturbed level of consciousness patients were dead (3.4% of the total fully conscious patient) and twelve patients from the disturbed level of consciousness patients were dead (36.4% of the total number of the disturbed level of consciousness patients (P-value = 0.000003).

**Table (6)** Distribution of disturbed level of consciousness in ischemic stroke patient admitted to Emergency department in Alexandria university hospital: demographic, clinical and laboratory characteristics.

	No.	Percentage	Mean / SD
<b>Age (year)</b>			59 / ±15
<b>Age</b>			
≤ 45 years	7	21.2	
≥ 45 years	26	78.8	
<b>Sex</b>			
Male	18	54.5	
Female	15	45.6	
<b>GCS*</b>			
Mild	12	36.3	
Moderate	11	33.3	
Severe	10	30.3	
<b>Intubation</b>			
Yes	11	33.3%	
No	22	67.7%	
<b>RBG* (mg/dl)</b>			192 / ±93.9
<b>Creatinine(mg/dl)</b>			1.1 / ± 0.47
<b>Na (mmol/L)</b>			131 / ±7.7

**Table 7:** Distribution of the disturbed level of consciousness cases according to the systolic blood pressure

Systolic B.P. mm.Hg	Frequency	Percent
90-<140	16	48.5
140-<180	12	36.4
>180	5	15.1
<b>Total</b>	33	100
<b>Mean B.P.</b>	<b>Standard Deviation</b>	
<b>141</b>	<b>±31</b>	

**Table 8:** Correlation between systolic blood pressure and the level of consciousness

Systolic B.P.	No DLC		DLC		P-value*
	n	%	n	%	
>140	58	65	17	51.5	0.209
<140	31	35	16	48.5	

\*Fisher's Exact test: MC technique.

**Table (9)(10)** Correlation of random blood glucose, Creatinine level and sodium levels with the level of consciousness.

	No DLC		DLC		$\chi^2$	P-value
	n.	%	n.	%		
<b>Random Blood Glucose</b>						
≤ 140	52	81.2	12	18.8	4.699	0.030*
> 140	37	63.8	21	36.2		
<b>Serum Creatinine (mg/dl)</b>						
≤ 1.2	76	76.0	24	24.0	2.613	0.106
> 1.2	13	59.1	9	40.9		

 $\chi^2$ : Chi square test\*: Statistically significant at  $\leq 0.05$ 

Na (mmol/L)	No DLC		DLC		P-value*
	n	%	n	%	
< 135	33	61.1	21	38.9	0.022**
135-145	53	82.8	11	17.2	
> 145	3	75.0	1	25.0	

\*Fisher's Exact test: MC technique, \*\*Statistically significant at  $\leq 0.05$ **Table (11) (12):** Distribution of Disturbed level of consciousness level patients according to the CT-brain Finding:

CT-Brain	No.	Percentage
Infra-tentorial infarctions	3	9
Supra-tentorial Infarctions	30	91
Total	33	100

CT-Brain	No.	Percentage
MCA* Infarction	15	45.5
Subcortical white matter Infarction	9	27.3
Basal Ganglia Infarction	4	12.0
Pontine Infarction	2	6.1
Small Cortical Infarction	2	6.1
Cerebellar Infarction	1	3
Total	33	100



**Table (13):** Middle Cerebral Artery Infarction and relation to disturbed level of consciousness

	Disturbed Level of Consciousness				$\chi^2$	p
	No (n = 89)		Yes (n = 33)			
	n.	%	n.	%		
<b>Middle Cerebral Artery Infarction</b>						
<b>No</b>	84	82.4	18	17.6	27.874	< 0.000*
<b>Yes</b>	5	25.0	15	75.0		

 $\chi^2$ : Chi square test\*: Statistically significant at  $\leq 0.05$ **Table 14 :** Correlation between the infratentorial infarctions and the disturbed level of consciousness

	Disturbed Level of Consciousness				$\chi^2$	p
	No (n = 89)		Yes (n = 33)			
	n.	%	n.	%		
<b>Infratentorial infarctions</b>						
<b>No</b>	89	100	30	91	8.295	0.0039*
<b>Yes</b>	0	0	3	9		

 $\chi^2$ : Chi square test\*: Statistically significant at  $\leq 0.05$ **Table (15):** Correlation between the disturbed level of consciousness and the mortality rate of patients:

	Disturbed Level of Consciousness				$\chi^2$	p
	No (n = 89)		Yes (n = 33)			
	n.	%	n.	%		
<b>Mortality</b>						
<b>Yes</b>	3	3.4	12	36.4	24.301	0.000003*
<b>No</b>	86	96.6	21	63.6		

 $\chi^2$ : Chi square test\*: Statistically significant at  $\leq 0.05$ 

## Discussion

During the period from 1/7/2014 to 31/12/2014 122 patients diagnosed in the emergency department of Alexandria university hospital with ischemic cerebrovascular stroke. We noticed that percentage of males more than females (54.9% for male vs 45.1% for females) this results similar to that reported by Giacomini et al and Gillum et al they reported that 60% of the ischemic stroke patients were males. (Giacomini et al., 1996)

The mean age of patients was 58 years this was younger than reported by White et al. as the mean age of patients was 70 years among different ethnic groups. (White et al., 2005)

We observed that 45% of cases were hypertensive, 29% of cases were diabetics and 6.6% of cases had Atrial fibrillation; according to Grau et al. Hypertension remains the most common risk factor where 66% of patients were hypertensive, diabetes comprises about 28% of cases and 26% of patients had atrial fibrillation. (Grau et al., 2001) Williams M. et al reported that old age is a risk factor for atrial fibrillation 70% of patients are older than 75 years (Williams et al., 2002), according to Abbott et al the attributable risk of atrial fibrillation increased, rising from 1.5% for those aged 50-59 years to 23.5% for those aged 80-89 years (Abbott et al., 1991); as mentioned before in this study the mean age of patients was 58 years.

Regarding the clinical presentation in the Emergency department: motor weakness or lag is the most common initial clinical presentation it was found in 60% of the cases with or without other clinical manifestations. Dysarthria is the second common presentation was present in 30% of the cases also associated with other clinical manifestations or sole presentation. Pure sensory manifestation were present in 2.45%; dysphasia and aphasia in 9% of the cases. Disturbed level of consciousness was noticed in 27% of the patients. CT-brain was done to all cases: Basal Ganglia infarctions were found in about 22.1% of patients, sub-cortical white matter infarctions in 41%, middle cerebral artery infarction in 16.4%, small cortical infarctions in 18%, cerebellar infarction in 0.8% and pontine infarction in 1.6%. Regarding complications of stroke it was noticed that 4% of cases suffered from early haemorrhagic transformation of ischemic stroke; all these cases are associated with rapid deterioration of the level of consciousness, none of these cases was subjected to thrombolytic treatment. Paciaroni et al stated that about 9% of ischemic cerebrovascular stroke suffer from early haemorrhagic transformation while 3% of patients undergo deterioration of the clinical course; some cases underwent thrombolytic treatment and hemorrhagic transformation occurred as a complication. (Paciaroni et al., 2008)

Brain swelling is a serious complication following Middle Cerebral Artery infarction and cerebellar infarction, it was noticed that 3.2% of cases had brain swelling following MCA infarction and 0.8% of cases had swelling complicating cerebellar infarction, we noticed that 20% of patients with MCA infarction suffered from brain swelling. Similar results were reported by Heinsius et al. (Heinsius et al., 1998)

All cases in the study were subjected to assessment of level of consciousness using the Glasgow Coma Scale, patient considered to have disturbed level of consciousness if Glasgow Coma Scale was less than 15. We noticed that 27% of patients suffered from disturbed level of

consciousness, 21% of them (n=7) aged younger than or equal 45 years; 54% of cases were males and 46% were female. The patients were classified into: mild (GCS 14-13), moderate (GCS 12-9) and severe (GCS 8-3) disturbed level of consciousness; mild category comprised about 36.3% of the disturbed level of consciousness patient, moderate 33.3% and severe 30.3%; those patients in severe category considered to be in deep coma and all of them required intubation and assisted ventilation. Bogousslavsky et al reported that about disturbed level of consciousness was the first presentation in 13-15% of the ischemic cerebrovascular stroke patients. (Bogousslavsky et al., 2007). 33% of the patients with disturbed level of consciousness were intubated and mechanically ventilated due to aspiration and deep coma; similar data were reported by Hassan et al. they mentioned that the circumstances surrounding mechanical ventilation were aspiration and generalized tonic clonic seizures or status epilepticus (Hassan et al., 2012), progression to stupor and inability to protect the airway from brain swelling. In this study: all cases of brain swelling that complicated cerebellar infarction (n=1) and 75% of brain swelling following MCA infarction (n=3) needed intubation to secure their airway. One case developed status epilepticus following stroke and was intubated.

According to the admission systolic blood pressure: it was noticed that the mean Systolic Blood pressure of all ischemic stroke patients presented to the emergency department was 144 mm.Hg with SD  $\pm$  24, while the mean systolic blood pressure of the disturbed level of consciousness group was 141 mm.Hg with SD  $\pm$  31.65% of the non-disturbed level of consciousness patients their admission systolic blood pressure was more than 140 mm.Hg, while 51.5% of the disturbed level of consciousness their admission systolic blood pressure was more than 140 mm.Hg, P-value = 0.209, denotes that there is no significant correlation between admission systolic hypertension and disturbed level of consciousness.



Regarding the CT-brain finding of the impaired level of consciousness patients it was found that 45.5% of patients had MCA infarction, 27.3% had subcortical white matter infarction, 12% had Basal Ganglia infarction, 6.1% had Cortical infarction, 6.1% had Pontine infarction and 1% had Cerebellar infarction. We concluded that Middle Cerebral artery infarction (MCA) was a very important CT-brain finding in this study: it was noticed that 16% of the patients suffered from MCA infarction from the total number of patients presented to the emergency department; 75% (n=15) of them suffered from disturbed level of consciousness and this comprises about 45% of the total number of disturbed level of consciousness patients in our study (P value < 0.000), there is significant association between the MCA artery infarction and the development of the disturbed level of consciousness in such patients. This large stroke makes the brain tissue more labile to swelling and hemorrhagic transformation, as mentioned before: brain swelling was noticed in about 20% of the MCA stroke. 40% of MCA stroke patients with disturbed level of consciousness (n=8) developed deep coma and needed intubation and mechanical ventilation to secure their airway. It was noticed that 37.5% (n=3) of these patients had brain swelling with midline shift more than 4 mm. and 25% of them had hemorrhagic transformation that also impacted an mass effect with midline shift more than 4mm. Oxbury et al indicated that middle cerebral artery infarction is an important cause of impaired level of consciousness, commonly produces fatal brain edema and makes the prognosis much worse. (Oxbury et al., 1981) Takagi et al stated that there is a significant relation between large volume infarction and the development of impaired level of consciousness. (Takagi et al., 1994)

The infratentorial infarctions comprised about 2.5% of the all the number of admitted ischemic stroke patients all of them suffered from disturbed level of consciousness and they were found in 9% of the disturbed level of consciousness patients (P-

value=0.0039) denotes there is a significant correlation between the infratentorial infarctions and altered level of consciousness. All patients suffered from infratentorial infarctions were in deep coma and intubated; the one patient suffered from cerebellar infarction developed cerebellar swelling. Hornig et al stated that cerebellar swelling due to infarction has delirious effect on the level of consciousness and emergency decompressive craniotomy is the treatment of choice. (Hornig et al., 1994)

Regarding the admission Glucose level: It was mentioned previously that Hyperglycemia makes the clinical outcome worse regardless of the presence of pre-existing diabetes mellitus it is associated with poor recovery and increased mortality. The mean admission random blood glucose level of the disturbed level of consciousness patient was 192 mg/dl while that of the non-disturbed level of consciousness was 175 mg/dl (P-value = 0.030), so there is a significant association between hyperglycemia and the impairment of the level of consciousness.

Regarding the serum Sodium level it was found that 44.3% (n = 54) of patients their Sodium level was less than 135 mmol/l and 38.9% (n = 21) of them suffered from disturbed level of consciousness (P-value = 0.022). The mean Sodium level of the disturbed level of consciousness patients was 131 mmol/dl (SD  $\pm$ 7.7). There is significant correlation between hyponatremia and development of disturbed level of consciousness. Rodrigues et al. observed that hyponatraemia was present in 16% of the ischemic stroke patients; they found that those patients had more severe manifestations and with poor clinical outcome. (Rodrigues et al., 2014)

Regarding the serum Creatinine level: Koren-Morag et al mentioned that Mild degrees of renal dysfunction are associated with increased risk of ischemic stroke. (Koren-Morag et al., 2006) It was found that 18% of the patients (n=22) had Creatinine level more than 1.2 mg/dl; 40.9% (n = 9) had disturbed level of consciousness (P-value=0.106). The mean Creatinine level of

disturbed level of consciousness group was 1.1 mg/dl (SD  $\pm$ 0.47 mg/dl) , it was concluded that there is no statistical significance between the raised Creatinine level and the development of impaired level of consciousness.

The overall mortality rate was 12.3%.The mortality rate was significantly much higher in the disturbed level of consciousness patients : 36.4% vs 3.4% in the non disturbed level of consciousness group.P-value=0.000003, so we concluded that disturbed level of consciousness in ischemic stroke patients had a negative impact and a significant risk factor in terms of mortality. Kolominsky-Rabas et al reported that Overall in-hospital mortality was 4.9%, they reported several risk factors namely: status epilepticus , pneumonia and increased intracranial pressure. (Kolominsky-Rabas et al.,2004)

### Conclusion

Ischemic Cerebrovascular stroke is one the important critical clinical condition that presents to the emergency department with significant effect on morbidity and mortality.

Disturbed level of consciousness is a common presentation of ischemic cerebrovascular stroke and it increases the burden of mortality and morbidity.

It was found the MCA infarctions and it's complication like brain swelling and haemorrhagic transformation were the most common etiology of disturbed level of consciousness in ischemic stroke patients.

Infra-tentorial infarctions although they are rare , they have an important impact in the occurrence of disturbed level of consciousness.

Other factors like: admission hyperglycemia regardless the patient is diabetic or not and admission hyponatremia played an important role in the development of disturbed level of consciousness of ischemic stroke patient.

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