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Zoology

Correlation of Clinical Computed Tomography Findings in Stroke Patients

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Abstract **Original Research Article**

The aim of this study to correlate of clinical computed tomography findings in stroke patients, where the total number of patients was 237 adult patients their age ranged from 19 up to 96 years (156 male and 81 females. study was conducted in Aliaa Specialist Hospital in period from August 2018 to February 2020, where the machine was Toshiba CT scan, Avilion 64slice multi-detector. And the results show frequency distribution for age group to all patients were divided to 8 groups start it from 19 up to 100 years. Were the more frequent age group being 70-79 years with 67 patients then age group 60-69 years with 45 patients while the age group 90-100 was shown lowest frequent with 4 patients. Correlate between history with age group where the history of patients was 12 disease and 8 age groups, where the patients with no clinical data was 47 patients, and the patients with different histories was 190 patients with 11 disease from the all 237 patients. And correlation between type of CVA with age group for all patients were the type of CVA was three types infraction, ischemic and hemorrhage. Correlate between CT appearance with age group were the appearance that revealing from computed tomography was 8 disease were the diagnose hypodense area was dominant with 75 patients and the diagnose right basal ganglia with just three patients. Finally; correlation between final diagnose with age group for all patients where the final diagnoses divided to 8 groups were the diagnose patients with hemorrhage was dominant with 86 patients then white matter ischemia with 49 patients while the diagnose Bilateral hypodense areas with lowest number of patients with just 4 patients. And the analysis of variance for all variables with patient's age were the p.value show that there is no significant difference between patients age with history, type of CVA, site, appearance and diagnose of CT.

Keywords: Computed Tomography, Clinical Findings, Stroke patients, Cerebrovascular Disease.

INTRODUCTION

Ischemic stroke currently represents one of the leading causes of severe disability and mortality in the western world and its early detection is extremely important [1, 2]. Several investigations have explored the risk factors for the development of ischemic events by confirming that the atherosclerotic disease of the carotid artery represents an important cause of the strokes [3, 4].

Computed tomography (CT) will differentiate infarct from hemorrhage up to at least five days after stroke. Recent hemorrhages are high density (white) and usually rounded and space occupying. Infarcts are usually low density (dark) and occupying a vascular territory with some swelling. In a patient with a stroke a normal scan excludes a hemorrhage and, in the absence of an alternative, infarction is assumed [5].

Clinical approach to stroke has undergone many changes in the past few years. CT scan has become an essential and integral part of the assessment and has given a more objective basis to the management and use of the IV contrast material. After non-contrast CT and the availability of follow-up studies in many instances significantly aids in the determination of the correct vascular etiology of the stroke, as does correlation of CT changes with patient's age, sex, history and neurological deficit.

The typology of stroke can be broadly classified into two categories: 1) hemorrhagic stroke due to rupture of a blood vessel, and 2) ischemic stroke or infarct due to an interruption of blood supply. Of these, ischemic stroke occurs more often, and it is also possible for the two Types of stroke to co- occur [6]. Computed tomography (CT) and magnetic resonance imaging (MRI) are the two modalities regularly used for stroke lesion mapping. Though it is not unusual For MR anatomic all images (usuallyT1-andT2-weightedimages) to be acquired in stroke patients participating in clinical research protocols, CT is the

preferred procedure in the acute stroke unit, typically offering the advantages of speed, cost, and reduced exclusion criteria relative to MR imaging [7].On the other hand, MR imaging is earlier at detecting ischemic stroke, and if available, is therefore performed in many cases with a negative CT scan. In CT images, a hemorrhage appears as a bright region (hyper-intense). Displaying sharp contrast against its surroundings. Conversely, an ischemic stroke appears as a dark region (hypo-intense), with the contrast relative to its surround depending on the time elapsed since the Stroke occurred.

The standard method for lesion identification is currently the manual delineation of abnormal brain tissue by trained professionals [8]; however, this method has a number of disadvantages [9]. The appearance of intracranial hemorrhage on CT is comparatively straightforward. There is a linear relationship between CT attenuation and hematocrit, hemoglobin concentration and protein content. Because the hematocrit of an acute retracted clot is around 90% and the globin (protein) component of hemoglobin has a high mass density, fresh intracerebral blood clots typically appear hyperdense on CT when compared to normal brain [10]. The attenuation of intracerebral hematomas decreases with time, diminishing at an average of 1.5 HU per day [11]. So, the aim of our study was to detect the clinical finding like infarct or hemorrhage, to determine the right diagnose and clinical symptoms to detect other causes simulating stroke.

METHODOLOGY

The study was conducted in Aliaa Specialist Hospital, Omdurman city, Sudan in period from August 2018 to February 2020. It was chosen as the most appropriate place to conduct this type of study, because there is an emergency department in the hospital with a high capacity and the hospital had a new CT with a new advanced software programme. Were the specification of the machine Toshiba CT scan, Avilion 64slice multi-detector. Tube 2.0 MHU MX 135, 3.9 million mAs, Software level 6.03, Fast scan 1.0 sec, Helical plus, 3D max, Power 200 mA, Acquisition, Helical 60 Max, Smart pre, It has voltage from 70- 150 kVp and four options of mA, High (200).

Sample Size: The sample size contained 237 Sundanese patients, all the patients were admitted in the hospital with suspected CVA disease and sent to medical imaging department for CT brain.

Data Collection: Data were collected from CT reports within electronic patient files of the hospital information system (HIS) then collected in a data sheet which is prepared specially for this task, it included all information needed to formulate this study such as: patient age, gender, pathology etc…

Non-enhanced contrast CT scan: Non-enhanced contrast scanning has been applied after activating a stroke code, for two reasons: highly sensitivity of a non CECT scan for depiction of hemorrhagic lesion and detection of hemorrhage or other possible mimics of stroke (e.g. neoplasm, arteriovenous malformation).

Computed tomography parameters

Scout: Lateral, Landmark: OML, Gantry tilt: 0º to 10º.from OM, Slice plane: Axial, Breath hold: None, I.V. Contrast: As required (40-50ml), Start location: Foramen Magnum, End location: Vertex, Slice thickness: 5 mm (from skull base to tentorial rim), 10 mm (from tentorial rim to vertex) and Filming: Soft tissue window and Bone window.

RESULTS

The total number of patients 237 adult patients their age ranged from 19 up to 96 years where the male was 156 patients while the female 81 patients and the results presents below:

Table-1: Show age group frequency for all patients

Age Group	Frequency	Percent
19-29	20	8.4
30-39	26	11.0
40-49	17	7.2
50-59	22	9.3
60-69	45	19.0
70-79	67	28.3
80-89	36	15.2
90-100	4	1.7
Total	237	100.0

Table-2: Show correlation between history with age group

History * Age Group Crosstabulation									
History	Age Group								Total
	19-29	30-39	40-49	50-59	60-69	70-79	80-89	90-100	
No Clinical Data	6	6	6	5	10	10	4	0	47
Right Side Weakness	2	1	1	2	4	5	5	0	20
Decrease LOC Sepsis	2	1	0	1	1	6	1	0	12
Left side hemiplegia	1	4	3	4	10	4	5	1	32
Multiple Stroke	0	5	1	5	5	13	9	1	39
Dementia	2	0	0	1	1	1	4	1	10

History * Age Group Crosstabulation									
Parkinson's Disease	0	0	0	0	0	1	0	0	1
Left leg Numbness	1	1	0	0	3	12	7	0	24
IVH + ICH	1	0	2	2	5	7	0	1	18
RTA	4	7	2	0	2	5	0	0	20
Meningioma	1	0	2	0	1	2	0	0	6
Hypertensive	0	1	0	2	3	1	1	0	8
Total	20	26	17	22	45	67	36	4	237

Table-3: Show correlation between type of CVA with age group for all patients

Type of CVA * Age Group Crosstabulation									
Type of CVA	**Age Group**								**Total**
	19-29	30-39	40-49	50-59	60-69	70-79	80-89	90-100	
Infraction	7	12	7	17	30	43	15	2	133
Ischemic	2	0	2	1	5	12	12	1	35
Hemorrhage	11	14	8	4	10	12	9	1	69
Total	20	26	17	22	45	67	36	4	237

Table-4: Show correlation between the site with age group

Site * Age Group Crosstabulation									
Site	**Age Group**								**Total**
	19-29	30-39	40-49	50-59	60-69	70-79	80-89	90-100	
No Clinical Data	0	0	0	0	0	0	0	1	1
Left occipitoparietal region	4	7	0	3	5	13	5	0	37
right occipital area	0	3	3	2	6	8	4	1	27
Bilateral peri-ventricular white matter	1	0	0	0	1	4	4	0	10
Bilateral occipital areas	2	0	0	2	3	3	2	0	12
Right posterior parietal area	3	3	5	2	7	9	6	1	36
Bilateral peri-ventricular area	4	4	2	2	5	9	11	0	37
Small right frontoparietal area	0	3	0	2	0	3	0	0	8
Bones Area	0	0	1	0	0	0	0	0	2
Left cerebellar hemisphere	0	1	2	8	5	9	2	1	28
Left capsular area	1	3	1	0	5	4	0	0	14
Right frontoparietal hypodense area	2	1	3	0	2	1	1	0	10
Bilateral para-ventricular area	3	1	0	0	6	4	1	0	15
Total	20	26	17	21	45	67	36	4	237

Table-5: Show correlation between CT appearance with age group

CT Appearance * Age Group Crosstabulation									
CT Appearance	**Age Group**								**Total**
	19-29	30-39	40-49	50-59	60-69	70-79	80-89	90-100	
Left frontal low density with cerebral infarction	2	4	2	2	7	6	1	0	24
white matter ischemic changes	0	1	4	3	7	18	12	0	45
Large hypodense area is noted consistent with infarct	2	1	3	5	7	9	6	2	35
hemorrhage	2	4	2	0	5	4	2	0	19
Bilateral peri-ventricular with white matter ischemia	2	4	1	3	3	7	6	0	26
Hypodense area noted	9	10	4	7	14	22	7	2	75
Hematoma	3	2	1	1	0	1	2	0	10
There is lacunar infarct at the right basal ganglia	0	0	0	1	2	0	0	0	3
Total	20	26	17	22	45	67	36	4	237

Table-6: Show correlation between final diagnose with age group for all patients

Final Diagnose * Age Group Crosstabulation									
Final Diagnose	**Age Group**								**Total**
	19-29	30-39	40-49	50-59	60-69	70-79	80-89	90-100	
Acute right frontal infarction	1	1	3	2	4	6	2	0	19
white matter ischemia	4	2	3	2	11	14	10	3	49
Bilateral old cerebral infarcts	10	9	3	6	14	24	20	0	86
"Left sided gliotic area with hemorrhage	2	6	5	4	3	4	1	0	25
"Left opccipital infract white matter ischemia "	1	6	2	3	10	14	3	0	39
Chronic left sided epidural hematoma	1	1	1	2	0	2	0	0	7
Acute left cerebral infarction	0	1	0	3	2	1	0	1	8
Bilateral hypodense areas are noted in para-ventricular regions	1	0	0	0	1	2	0	0	4
Total	20	26	17	22	45	67	36	4	237

Table-7: Show analysis of variance for all variables with patient's age

ANOVA						
		Sum of Squares	**df**	**Mean Square**	**F**	**p.value**
History	Between Groups	2081.484	61	34.123	1.150	.241
	Within Groups	5193.234	175	29.676		
	Total	7274.717	236			
Type of CVA	Between Groups	57.890	61	.949	1.309	.090
	Within Groups	126.828	175	.725		
	Total	184.717	236			
Site	Between Groups	728.760	61	11.947	1.002	.483
	Within Groups	2074.710	174	11.924		
	Total	2803.470	235			
CT Appearance	Between Groups	174.266	61	2.857	.695	.949
	Within Groups	718.873	175	4.108		
	Total	893.139	236			
Final Diagnose	Between Groups	176.387	61	2.892	1.307	.092
	Within Groups	387.191	175	2.213		
	Total	563.578	236			

DISCUSSIONS

Table-1 show frequency distribution for age group to all patients were divided to 8 groups start it from 19 up to 100 years. Were the more frequent age group being 70-79 years with 67 patients then age group 60-69 years with 45 patients while the age group 90-100 was shown lowest frequent with 4 patients.

Table-2 show correlation between history with age group where the history of patients was 12 disease and 8 age groups, where the patients with no clinical data was 47 patients, and the patients with different histories was 190 patients with 11 disease from the all 237 patients.

Table-3 show correlation between type of CVA with age group for all patients were the type of CVA was three types infraction, ischemic and hemorrhage. And the age group was 8 groups. The patients with infraction type were 133 patients, ischemic patients was 35 while the hemorrhage for 69 patients. Table-4 show correlation between the site with age group where the number of sites was 13 area where the patients with no clinical data was just one patient, while the patients with different sites was 236 patients.

Table-5 show correlation between CT appearance with age group were the appearance that revealing from computed tomography was 8 disease were the diagnose hypodense area was dominant with 75 patients and the diagnose right basal ganglia with just three patients.

Table-6 show correlation between final diagnose with age group for all patients where the final diagnoses divided to 8 groups were the diagnose patients with hemorrhage was dominant with 86 patients then white matter ischemia with 49 patients while the diagnose Bilateral hypodense areas with lowest number of patients with just 4 patients.

Table-7 show analysis of variance for all variables with patient's age were the p.value show that there is no significant difference between patients age

with history, type of CVA, site, appearance and diagnose of CT.

CONCLUSION

The correlate of clinical computed tomography findings in stroke patients, where the total number of patients was 237 adult patients. And the correlation between history with age group where the history of patients was 12 disease and 8 age groups, where the patients with no clinical data was 47 patients, and the patients with different histories was 190 patients with 11 disease from the all 237 patients. And correlation between type of CVA with age group for all patients were the type of CVA was three types infraction, ischemic and hemorrhage. And the age group was 8 groups. The patients with infraction type were 133 patients, ischemic patients was 35 while the hemorrhage for 69 patients. Correlate between the site with age group where the number of sites was 13 area where the patients with no clinical data was just one patient, while the patients with different sites was 236 patients. Correlate between CT appearance with age group were the appearance that revealing from computed tomography was 8 disease were the diagnose hypodense area was dominant with 75 patients and the diagnose right basal ganglia with just three patients. Finally; correlation between final diagnose with age group for all patients where the final diagnoses divided to 8 groups were the diagnose patients with hemorrhage was dominant with 86 patients then white matter ischemia with 49 patients while the diagnose Bilateral hypodense areas with lowest number of patients with just 4 patients.

And the analysis of variance for all variables with patient's age were the p.value show that there is no significant difference between patients age with history, type of CVA, site, appearance and diagnose of CT.

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