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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.
GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.
ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ,რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

Содержание:

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CLINICAL AND RADIOLOGICAL PROFILE OF PATIENTS PRESENTING WITH CEREBROVASCULAR ACCIDENTS: A CROSS-SECTIONAL STUDY

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Abstract.

Background: Cerebrovascular accidents are considered as a major cause of disability and death worldwide, presenting with different clinical as well as radiological characteristics. An accurate diagnosis and management depends on the interpretation of these profiles. This study explores the clinical and radiological characteristics of stroke patients to enhance diagnostic and therapeutic approaches.

Methods: This cross-sectional study was conducted on 360 patients clinically diagnosed with recent stroke at teaching hospitals in Duhok, Iraq. Unenhanced CT imaging was performed using standardized protocols to evaluate stroke characteristics. Data were collected on demographics, comorbidities, stroke classification, lesion features, and affected vascular territories. Statistical analyses were carried out using SPSS version 22, with chi-square tests and independent t-tests employed to assess associations. Statistical significance was determined at a threshold of $p < 0.05$.

Results: This study of 360 CVA patients (mean age 68.67 ± 13.45 years; 65.3% male) found that ischemic strokes were the most common type (59.4%), followed by hemorrhagic strokes (28.3%) and normal CT findings (12.2%). Hypertension (76.9%) and heart disease (64.7%) were the leading comorbidities, with 43.1% of patients having a prior CVA history. Lesions were predominantly right sided (46.9%) and frequently involved the middle cerebral artery territory (33.6%). Ischemic strokes had larger lesions (mean 32.48 mm) but lower densities (27.74 HU) compared to hemorrhagic strokes (23.56 mm; 63.70 HU). Statistical analysis revealed significant differences between stroke types in age, lesion size, and density ($p < 0.001$).

Conclusion: Ischemic strokes were the predominant type of CVA, with significant differences in lesion size and density compared to hemorrhagic strokes. Hypertension and heart disease emerged as the most critical comorbidities, highlighting the need for targeted prevention and management Strategies.

Key words. Stroke, cerebrovascular accident, clinical and radiological findings.

Introduction.

A cerebrovascular accident is considered as an urgent medical condition distinguished by a sudden disruption of brain perfusion [1].

Hypertension is the primary cause of ischemic stroke [2] although hyperlipidemia, smoking, physical Inactivity and obesity are also prevalent causes [3].

Worldwide, stroke is the second leading cause of death. More than 101 million people have a stroke each year, and more than 6.6 million people die of a stroke annually. About 1 in 4 stroke survivors will experience another stroke within five years [4] there is a sex related discrepancy in the lifelong risk of stroke which is more elevated in women compared to men due to their increased life expectancy [5].

Neuroimaging is crucial in stroke patients, particularly those with acute ischemic stroke. It aids in distinguishing alternative etiologies of stroke (e.g., migraine, neoplasms, seizures, metabolic disturbances, and peripheral or cranial nerve disorders), early identification of hemorrhagic stroke, differentiation of irreversibly infarcted tissues from salvageable ones, detection of vascular malformations, and formulation of treatment strategies for intravenous thrombolysis and intra-arterial thrombectomy, and prognostication of outcomes [6,7].

The clinical profiling of CVA not only aids in identifying risk factors and stroke subtypes but also improves patient outcomes by guiding personalized care strategies. It also highlights the importance of analyzing personal and clinical characteristics in managing cerebrovascular accidents (CVAs). By examining factors such as patient demographics, medical history, and neurological examination findings [8,9].

Aim of the study.

Although there are some studies in our community regarding cerebrovascular accident, this paper will help to shed the light on the significance of using advanced imaging modalities to establish a better diagnosis and management outcomes. The study aims at identifying the clinical and radiological profiles in CVA patients in addition to assessing the association between some comorbidities and stroke clinical characteristics and imaging findings.

Patients and Methods.

The study is a hospital-based cross-sectional that was conducted on patients admitted and clinically diagnosed as having a recent cerebrovascular accident by specialized neurologists and transferred to the radiological department at Emergency Azadi, Azadi, and Zakho Teaching Hospitals. After receiving them, unenhanced CT scan imaging was performed in various orthogonal planes,

I. Data Collection:

Data were collected during the period from February 2023 to December 2024, with a total of 360 patients with the male patients being 235, and the female 125, then the proper imaging technique was chosen using Toshiba and Philips 64 slices, multiple axial, coronal and sagittal, three-dimensional (3d) reformatted sections were taken for the patients who were in a lying position and without the need for preliminary preparation.

Imaging was done in the following parametrs: 140 Kv. 170 ma, 4-5 mm slice thickness, 0.5 image spacing ,0.8 sec. rotation time, 22 cm field of view. Windows included were standard bone and soft tissue and special windows for stroke in the setting (35 Hounsfield units (HU) -100HU window width level), images were investigated by two specialized radiologists with an experience of more than 15 years in the field.

After the images were captured, Data were analyzed to obtain the overall incidence of stroke according to age, gender, time interval between the symptoms and the CT examination, the main CT imaging criteria which included the following (the type of stroke {ischemic or hemorrhagic}, Right or left sided, special location such as in the brain, ventricular system or basal ganglia, then the lesion density in Hounsfield units, the surrounding perilesional edema or mass effects or both, the vascular territories involved in stroke occurrence) and detailed risk factors.

Data Collection Methods:

• **Clinical Data:**

o Demographic information such as age and sex of the patients.

o Presence of comorbidities: hypertension, diabetes mellitus, heart diseases, smoking habits, and history of trauma. (Also, other specific comorbid conditions were collected, as indicated in "etc.").

• **Radiological Data:**

o Computed Tomography (CT) scan findings.

o Location of the lesion (right or left sided, anatomical areas in the brain).

o Involved vascular territories (specific arteries affected).

o Surrounding cerebral features, such as the presence of edema (brain swelling).

Variables and Measurements.

• **Primary Variable (s):**

o Type of CVA (categorized into ischemic stroke, hemorrhagic stroke, and normal CT scan findings).

• **Secondary Variables:**

o Lesion size (possibly measured in cm^3 or diameter).

o Side of the lesion (right or left hemisphere).

o Lobe involvement (frontal, parietal, temporal, occipital, insular, or more than one).

o Presence of different comorbidities.

Inclusion Criteria:

All patients who were clinically diagnosed as having a recent cerebrovascular accident and were referred by a specialized neurologist aged 18 years old and above, Clinical diagnosis of stroke was established by specialized neurologists of 10 years' experience based on sudden onset neurological deficits consistent with cerebrovascular events, supported by clinical examination and medical history, in this study CT was used because of its availability and easiness compared to limited access to Magnetic Resonance imaging (MRI), All patients underwent initial diagnosis through CT imaging. Patients with normal CT scans but persistent clinical suspicion of ischemic stroke were subsequently assessed using MRI, which is not the subject of this study.

Exclusion Criteria

1. Unsatisfactory images due to either technical errors or excessive patient movement.
2. Patients with associated congenital brain anomaly.
3. Simultaneous finding of a space occupying lesion or a venous thrombotic changes during the imaging study.
4. Any patient with a subacute or chronic stroke depicted in the same CT scan image.

Sample Size Justification.

• The sample size for this cross-sectional study was determined using the prevalence of cerebrovascular accidents (CVAs) in Iraq, which ranged from 31.33 per 1000 in 2000 to 45.82 per 1000 in 2015. To ensure adequate representation, the higher prevalence value of 45.82 per 1000 (4.582%) was used in the calculation. A margin of error of 5% and a 95% confidence level (Z = 1.96) were chosen. The formula for sample size calculation for large populations was applied: $N= z^2.p.(1-p)/ E2$

• The minimum sample size required was calculated to be 67 participants. However, this study included a total of 360 patients to increase precision, enhance statistical power, and allow for subgroup analyses. The larger sample size also ensured better representation of the population and accounted for potential missing data or non-responses.

Ethical Consideration.

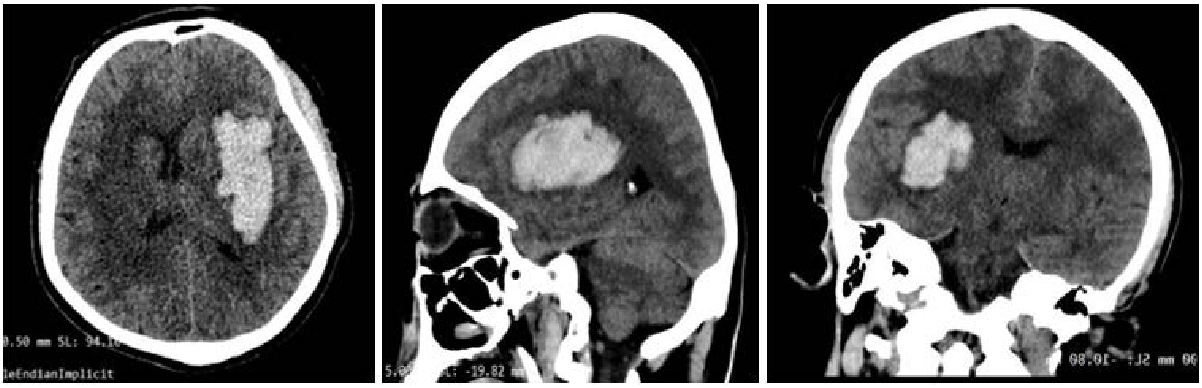
The study was approved by the Local Health Ethics Committee of the Duhok General Directorate of Health. Written informed consent was obtained from each patient or their respective relatives, who provided detailed medical history and information regarding associated risk factors, all of which were systematically documented in individual case sheets.

Statistical Analysis.

The data, initially saved using Microsoft Excel, was analyzed using Statistical Package for the Social Sciences (SPSS) version 22. For Descriptive Statistics: Continuous variables such as age, and lesion size were summarized using means and standard deviations to provide an idea of their central tendency and variability. While Categorical data, including the type of CVA, presence of comorbidities, lesion location, and vascular territory involvement, were presented as frequencies (counts) and percentages to depict the distribution of these variables within the study population. To investigate the associations between categorical patient characteristics and CT findings, several statistical tests were employed. Chi-Square Test was utilized to determine if statistically significant relationships existed between categorical variables. To compare the means of continuous variables between patients with ischemic and hemorrhagic strokes, independent samples t-tests were conducted. For all statistical analyses, a significance level (alpha) of 0.05 was adopted. This means that a p-value less than 0.05 ($p < 0.05$) was considered statistically significant, indicating that observed relationships were unlikely due to random chance.

Results.

This study included 360 patients diagnosed with cerebrovascular accidents (CVAs), with ages ranging from 21 to 96 years. The mean age of the cohort was 68.67 years



1A 1B 1C

Figure 1. *Non-contrast CT of the head in a 63-year-old male who presented with a history of a stroke of 8-hour duration. (A: axial, B: sagittal, C: coronal) images reveal a hyperdense hemorrhagic lesion in the left frontal, parietal, and temporal lobes, surrounded by an area of hypodensity indicative of edema. The lesion shows mass effect, with compression of the ipsilateral lateral ventricle and mild effacement of adjacent sulci. There is no significant midline shift. These findings are consistent with a hemorrhagic infarction likely involving the left middle cerebral artery (MCA) territory, with both ischemic and hemorrhagic components.*

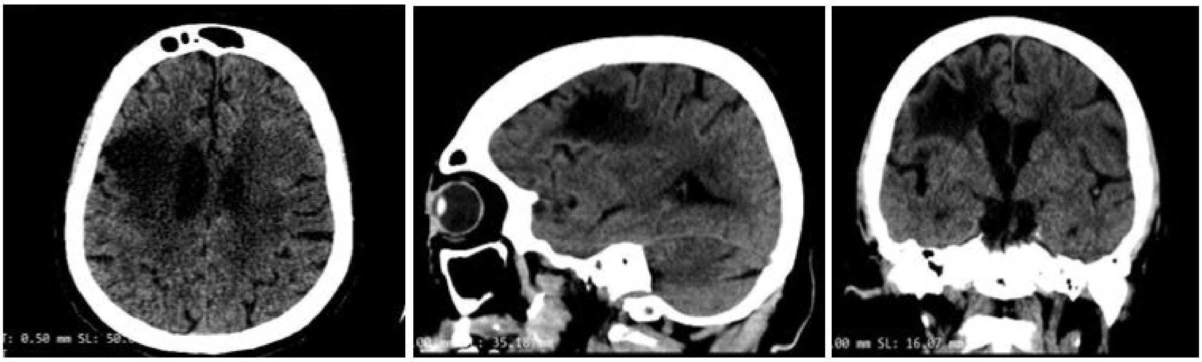


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Figure 2. *Non-contrast CT of the head in a 59-year-old female who presented with left hemiparesis and difficulty in speech. (A: axial, B: sagittal, C: coronal) reveals a wedge-shaped, hypodense lesion measuring 44 mm x 25 mm, involving the right frontal and parietal lobe cortex and subcortical white matter, with loss of gray–white differentiation. The lesion extends anteriorly toward the right frontal lobe. There is no significant mass effect, though slight widening of the right lateral ventricle is noted, likely due to surrounding edema. No hyperdense hemorrhagic component is identified. These findings are characteristic of a chronic right middle cerebral artery (MCA) territory infarction.*

Table 1. *CT scan Radiological Findings of Patients with Cerebrovascular Accidents.*

Category	**Subcategory**	**Frequency (n)**	**Percent (%)**
Type of the stroke	Ischemic	214	59.4
	Hemorrhagic	102	28.3
	Normal CT	44	12.2
	Total	360	100
Side of the Lesion	Right	169	46.9
	Left	132	36.6
	Bilateral	15	4.2
	No lesion	44	12.2
	Total	360	100.0

(±13.45). Of the participants, 65.3% (235 patients) were male, and 34.7% (125 patients) were female. A significant portion of patients had one or more common comorbidities: 76.9% had hypertension, 31.4% had diabetes, 64.7% had heart disease, and 36.9% were current smokers. Additionally, 29.4% had a history of recent or remote head trauma, 44.7% had a family history of CVA, and 15.3% had a history of brain space-occupying lesions (SOL). Approximately 43.1% of patients had a history of previous CVA attacks.

The CT findings revealed three primary types of strokes,

Table 2. *Associations Between Patient Demographics, Clinical Risk Factors, and CT Imaging Findings (Ischemic, Hemorrhagic, Normal).*

Variable	Level	Ischemic (n)	Hemorrhagic (n)	Normal (n)	Pearson Chi-Square	*p*-value
Sex	Male	158	45	32	28.135	<.001
	Female	56	57	12		
Site of Lesion	No lesion	0	0	44	368.11	<.001
	Right	123	45	0		
	Left	87	46	0		
	Bilateral	4	11	0		
Lobe	No Lesion	0	0	44	518.12	<.001
	Centrum Semiovale	8	7	0		
	Basal Ganglia	16	11	0		
	Basal ganglia+IVH	0	3	0		
	Bithalamic	0	1	0		
	Both Lobes	1	0	0		
	Cerebellum	0	1	0		
	Epidural	0	2	0		
	Frontal	30	6	0		
	Frontoparietal	21	2	0		
	Frontoparietal Occipital	1	0	0		
	Internal Capsule	0	1	0		
	IVH	0	9	0		
	Occipital	31	7	0		
	Occipitoparietal	18	2	0		
	Parietal	51	4	0		
	Parietal+BG	0	1	0		
	SAH	0	5	0		
	SAH+IVH	0	2	0		
	Temproparietal	4	3	0		
	Temporal	27	1	0		
	Thalamic	6	34	0		
Territory	No lesion	0	0	44	383.66	<.001
	ACA	30	7	0		
	ACA+MCA	26	2	0		
	ACA+PCA+MCA	2	0	0		
	BA	0	1	0		
	MCA	90	30	0		
	MCA+PCA	26	17	0		
	PCA	40	45	0		
Surrounding Cerebral Features	No surrounding features	0	0	~~44~~	364.04	<.001
	Oedema	77	48	0		
	Oedema and Mass Effect	137	54	0		
Hypertension (HT)	Positive	183	69	25	23.876	<.001
	Negative	31	33	19		
Diabetes Mellitus (DM)	Positive	68	29	16	0.935	0.627
	Negative	146	73	28		
Heart Disease	Positive	157	61	15	26.162	<.001
	Negative	57	41	29		
Smoking	Positive	97	26	10	16.017	<.001
	Negative	117	76	34		
Trauma	Positive	60	30	16	1.218	0.544
	Negative	154	72	28		
Removed brain SOL	Positive	17	33	5	32.389	<.001
	Negative	197	69	39		
Family History	Positive	101	39	21	2.427	0.297
	Negative	113	63	23		
Previous Attack	Positive	106	37	12	10.045	0.007
	Negative	108	65	32		

****Note:*** *p-values indicate statistical significance, with values < .05 considered significant. (n) represents the raw frequency or count.*
*****Note:*** *a Abbreviations: HT, hypertension; DM, diabetes mellitus; SOL, space-occupying lesion; ACA, anterior cerebral artery; MCA, middle cerebral artery; PCA, posterior cerebral artery; BA, basilar artery; IVH, intraventricular hemorrhage; SAH, subarachnoid hemorrhage; BG, basal ganglia.*

Table 3. T-Test Results for Age, Lesion Size, and Lesion Density.

Variable	CT Findings	Mean	Mean Diff.	95% CI* Lower	95% CI*Upper	p-value
Age (Years)	Ischemic	73.24	6.79	4.24	9.35	<0.001
	Hemorrhagic	66.45				
Lesion Size (mm)	Ischemic	32.48	8.92	6.74	11.11	<0.001
	Hemorrhagic	23.56				
Density (HU)	Ischemic	27.74	-35.96	-38.62	-33.29	<0.001
	Hemorrhagic	63.70				

*CI=confidence interval.

ischemic strokes were the most common, accounting for 59.4% of cases (214 patients). Hemorrhagic strokes followed, comprising 28.3% of cases (102 patients) and Normal CT findings were seen in 12.2% of cases (44 patients).

Regarding lesion location, 46.9% (169) of patients had lesions on the right side of the brain, 36.6% had left-sided lesions (132), and only 4.2% had bilateral lesions. In 12.2% of cases, no lesions were visible on the CT scans, see Tables 1 and 2.

The distribution of lesions across the brain lobes was as follows: the parietal lobe was most commonly affected in 15.3% of patients (55 cases), followed by the occipital lobe (10.8%, 39 cases), and the thalamic region (11.1 %, 40 cases). In terms of vascular territories, the middle cerebral artery (MCA) territory was involved in 33.3% (120 patients), while the posterior cerebral artery (PCA) territory was affected in 23.6% (85 patients).

The average size of ischemic strokes was 32.53 mm, while hemorrhagic strokes had an average size of 23.47 mm. Cerebral edema was noted in 34.7% of cases (125 patients), and edema with mass effect was observed in 53.0% (191 patients).

A statistical analysis was performed to examine associations between patient characteristics and CT findings. The results showed statistically significant associations ($p < .001$) for several variables, including Sex, Site of Lesion, Lobe, Territory, Surrounding Cerebral Features, Hypertension (HT), Heart Disease, Smoking, Removed SOL, and Previous Attack ($p = 0.007$), while other factors like Diabetes, Trauma, and Family History showed no statistically significant relationship. Table 2 shows the associations between the various patient characteristics and the CT findings.

Our analysis revealed several compelling connections between patient characteristics and the type of brain injury observed on CT scans. We found that sex plays a significant role, with men experiencing ischemic strokes more frequently, while women showed a higher incidence of hemorrhagic strokes.

The location of the stroke was also a key factor, with ischemic strokes predominantly occurring on the right side of the brain, while the hemorrhagic stroke occurs equally in both sides, and different lobes being more prone to specific types of strokes (e.g., parietal, occipital and frontal lobes more prone to ischemic, and the thalamus more prone to hemorrhagic).

The specific vascular territory affected also appears to be related to the CT findings. Particularly, ischemic strokes more commonly occur in the Middle Cerebral Artery and the hemorrhagic stroke is more common in the Posterior Cerebral Artery. Furthermore, the presence of surrounding edema and mass effect were found to be tightly linked to both ischemic and hemorrhagic lesions.

Certain health conditions also had a clear impact, with a history of hypertension and heart disease, as well as smoking, all strongly linked to ischemic strokes. In addition, patients with a previous removed SOL as well as previous attack were more likely to have an ischemic stroke. Interestingly, no significant association was found with diabetes, trauma, or family history. In each of these significant relationships, the relationship was statistically significant ($p<0.001$), or at minimum $p < 0.007$, indicating that these relationships are unlikely due to random chance. However, for DM, Trauma, and family history, these relationships were not significant ($p > 0.05$), and therefore more research is needed.

Independent-samples t-tests revealed significant distinctions between ischemic and hemorrhagic stroke patients in terms of age, lesion size, and lesion density. Specifically, individuals with ischemic strokes were older (mean ± SD: 73.24 ± X years) than those with hemorrhagic strokes (66.45 ± Y years; $p < 0.001$). Lesion measurements also differed markedly: ischemic infarcts averaged 32.48 mm in diameter compared to 23.56 mm for hemorrhages ($p < 0.001$). Finally, the average Hounsfield density of ischemic lesions (27.74 HU) was significantly lower than that of hemorrhagic lesions (63.70 HU; $p < 0.001$). Together, these results underscore pronounced imaging and demographic contrasts between stroke subtypes, with potential implications for prognosis and tailored clinical management.

Discussion.

This study offers a comprehensive analysis of the clinical presentations and radiological findings in patients with cerebrovascular accidents, shedding light on the diverse manifestations, underlying etiologies, and imaging patterns observed in such cases. By examining these profiles, the research not only enhances our understanding of the diagnostic complexities associated with stroke but also underscores the significance of early detection and targeted interventions in improving patient outcomes. The findings contribute to the growing body of evidence aimed at refining diagnostic protocols and therapeutic strategies for cerebrovascular disorders.

Ischemic lesions were the most frequent finding, occurring in 59.4% (n=214) of the patients. This is consistent with previous research showing that ischemic strokes was the most stated kind in studies including all types of stroke (60–90.1%) (El-Hajj M et al., 2016) [10].

Hemorrhagic strokes were found in 28.3% (n=102) of all the patients. Variable prevalence rates of hemorrhagic strokes, which normally fall between 10 and 20 percent in general stroke populations, are reported in other studies (Mackenzie et al., 2019) [11] A particular population or methodological biases may be the cause of this study's increased prevalence. El-Hajj M et al. reported that intracerebral hemorrhage is the second most accounted type of stroke (6.5–30.7%) [10].

A notable 12.2% (n=44) of the cases presented with normal CT findings, emphasizing the potential for false negatives in acute stroke scenarios particularly for imaging that was done at a very early stage [12,13].

The thalamic (11.1 %) and parietal (15.3%) areas accounted for the majority of lesions. This result is in line with earlier research showing that the parietal lobe's vascular supply often causes it to be impacted when the middle cerebral artery (MCA) is blocked (Takamatsu et al., 2020) [14]. Non lacunar infarction was reported in 40–76.5% of stroke in many studies [15,16].

In one study the parietal (41.7%) was the most often infarcted site, followed by the frontal (12.5%) and basal ganglia (16.7%). These results are indicative of middle cerebral artery involvement [17].

In this research, The MCA was the most commonly affected vascular territory at 33.6% (n=121), followed by the PCA at 23.9% (n=86).

A substantial proportion of patients (53.3%) exhibited edema plus mass effect. The presence of edema following ischemic injury is well-documented and correlates with increased intracranial pressure and potential for secondary brain injury (Lee & Lee, 2017) [18]. In the initial hours following stroke, gray matter attenuation is seen on CT, leading to an insular ribbon, unclear basal ganglia, and a lack of gray/white matter contrast in the brain. Cortical sulci may vanish as edema progresses, and white matter hypo attenuation occurs. Midline Shift (MLS) develops in the latter stages when ventricles may contract due to an increase in parenchymal volume [19].

The data show that lesions were more frequent on the right side (46.9%) compared to the left (36.9%) and bilaterally (4.2%). While some studies report a more balanced distribution [20], the predominance of right-sided lesions could relate to demographic or risk factor differences in this cohort. Hedna vs et al. [21], reported that Left-hemispheric strokes (54%) were more common than right-hemispheric strokes (46%).

The study reveals that men were diagnosed with ischemic strokes at a significantly higher rate than women. This finding aligns with existing literature, which consistently reports a higher prevalence of strokes among men, particularly in younger age groups. The American Heart Association emphasizes this disparity while highlighting the importance of considering hormonal and lifestyle factors, which can influence stroke risk differently between sexes. These differences underscore the need for sex-specific prevention strategies and tailored approaches to stroke management [22,23].

In the current study there were notable correlations with respect to lobe involvement, with ischemic strokes primarily affecting the parietal lobe and hemorrhagic instances more often affecting the thalamic areas. This aligns with previous research demonstrating the susceptibility of the parietal lobe to ischemic strokes. The association of ischemic strokes with the parietal lobe is well-documented in the literature. The parietal lobe's vulnerability to ischemia can be attributed to its vascular supply, primarily from the middle cerebral artery (MCA) [10,14].

This study finding does not completely align with previous studies, naming the putamen as the most common site for ICH is significant, particularly in patients with chronic hypertension, which raises the question of regional variability in stroke presentations [24,25].

The study found a clear correlation between high blood pressure and a higher risk of hemorrhagic and ischemic strokes. This is consistent with other research study that highlight hypertension as the most common primary modifiable risk factor for strokes of both kinds. According to data from 30 research, hypertension has been found in roughly 64% of stroke patients [26,27].

Because diabetes promotes atherosclerosis and thrombogenesis, it is frequently linked to an increased risk of ischemic stroke. Patients with diabetes are significantly more likely to experience an ischemic stroke than people without the disease [28]. Additionally, diabetes may result in lower functional outcomes and complicate the rehabilitation process following a stroke [29,30]. This emphasizes how crucial it is to appropriately manage diabetes mellitus in at-risk groups in order to reduce the risk of stroke.

In this study, the relationship between diabetes and stroke type did not reach statistical significance ($p = 0.627$), suggesting that while DM may be a common comorbidity, its isolated impact on the type of stroke found (ischemic or hemorrhagic) in the study sample were less pronounced.

The risk of stroke is greatly increased by heart diseases, like atrial fibrillation, coronary artery disease, and heart failure. The most frequent cardiac arrhythmia and the reason for cardioembolic stroke is atrial fibrillation (AF). This is linked to blood stasis and reduced cardiac output, which are linked to elevated levels of prothrombotic fibrinogen, D-dimer, and von Willebrand factor. This leads to the production of thrombus in the atrial appendage, which raises the risk of cardioembolic stroke [31,32], additionally, ischemic heart disease patients often have overlapping pathology that puts them at risk for stroke and other cardiovascular events.

There is ample evidence linking smoking to stroke. Because smoking affects blood pressure, promotes atherosclerosis, and increases the risk of thrombosis, the American Heart Association states that smoking raises the risk of both ischemic and hemorrhagic strokes [33]. According to a study by Gallucci et al., (2020) [34], smoking may worsen outcomes following a stroke and aggravate neurological abnormalities.

Hemorrhagic strokes can result from trauma, especially when there are brain traumas, however the exact effect can change depending on the situation. Research indicates that the severity and manner of injury are frequently associated to intracerebral hemorrhages caused by trauma (Grewal et al., 2015) [35].

Intracerebral hemorrhages that can cause substantial morbidity and mortality include subdural and epidural hematomas and subarachnoid hemorrhages. In order to prevent future vascular events, ICH survivors should prioritize good secondary prevention due to their elevated global vascular risk [36]. Furthermore, because of possible alterations in vascular integrity and vasculature, a history of cerebral bleeding increases the risk of ischemic stroke [37].

The presence of prior attacks also significantly correlates with eventual stroke occurrence ($p = 0.007$). Previous studies indicate that a history of transient ischemic attacks (TIAs) greatly increases the risk of subsequent ischemic strokes, reinforcing the need for aggressive secondary prevention strategies [32].

One known risk factor for stroke is family history; multiple studies have shown that those who have a first-degree relative with a history of stroke are more likely to have a stroke themselves (Lisabeth et al., 2005) [38,39], although the exact mechanisms behind this link are unknown, they might involve lifestyle decisions, environmental factors, and shared genetic traits. Although this study found no significant correlation between family history and stroke, family history should still be taken into account when doing a thorough risk assessment for stroke.

Given the significant difference in lesion size, it is likely that ischemic strokes result in larger lesions than hemorrhagic strokes. The underlying mechanisms of each type of stroke may be responsible for this discrepancy. Ischemic strokes are usually brought on by arterial occlusions that impact wider vascular territories, causing more extensive tissue damage than hemorrhagic strokes, which are caused by localized hemorrhage [40].

Hemorrhagic strokes typically show up on CT imaging with a higher density than ischemic strokes, according to the notable difference in lesion density. This difference can be explained by the presence of blood, which has a greater density than the brain tissue that has been infarcted. Radiologists and neurologists must comprehend these imaging features in order to distinguish between different forms of stroke and to guide clinical judgment [41].

By incorporating these findings into the clinical practices, healthcare providers can improve risk assessments and diagnostic strategies, customize treatment protocols, and implement successful public health initiatives. In the end, this comprehensive approach will contribute to better prevention, management, and rehabilitation of stroke patients, which will improve clinical outcomes and quality of life for affected individuals. This study analysis of cerebrovascular accidents serves as a reminder of the critical interplay of various risk factors, demographics, and stroke characteristics in clinical practice.

Conclusion.

This study highlights that ischemic strokes are the most prevalent type of cerebrovascular accident, with distinct characteristics such as larger lesion size and lower density compared to hemorrhagic strokes. Hypertension and heart disease were identified as the most significant comorbidities, emphasizing their critical role in stroke risk. The findings underscore the importance of early diagnosis, targeted prevention strategies, and tailored management to address the diverse clinical and radiological profiles of stroke patients effectively.

Recommendations.

Prioritize the prevention and management of hypertension and heart disease through targeted public health strategies and systematic screening of high-risk populations. Advocate for the adoption of advanced imaging protocols to enhance diagnostic accuracy and facilitate personalized treatment approaches. Increase public awareness of stroke symptoms to reduce delays in seeking medical care and improve clinical outcomes.

Limitations.

The cross-sectional design limits causal inferences, and reliance on CT imaging may have missed subtle findings detectable by MRI. The study's regional focus restricts generalizability, and the lack of long-term follow-up data prevents assessment of outcomes and recurrence.

Abbreviations.

ACA: Anterior Cerebral Artery
BA: Basilar Artery
BG: Basal Ganglia
CI: Confidence Interval
CVA: Cerebrovascular Accident
CT: Computed Tomography
DM: Diabetes Mellitus
HT: Hypertension
HU: Hounsfield Units
IVH: Intraventricular Hemorrhage
MCA: Middle Cerebral Artery
MRI: Magnetic Resonance Imaging
SAH: Subarachnoid Hemorrhage
SD: Standard Deviation
SOL: Space-Occupying Lesion
SPSS: Statistical Package for the Social Sciences
3D: Three-Dimensional

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