# `Educational Sessions about Stroke Prevention among Patients with Transient Ischemic Attack

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## Abstract

**Background:** A transient ischemic attack (TIA) is a warning signs of stroke with similar symptoms . it can serve as both a warning of a future stroke and an opportunity to prevent it **. The study aimed** to evaluate the effect of educational sessions about stroke prevention among patients with Transient Ischemic Attack. **Research design:** Quasi-experimental research design was used to conduct the aim of this study. **Settings:** The study was conducted at the neurological department and outpatient clinics affiliated with Benha University Hospital, Egypt. **Subjects:** A purposive sample of (133) adult patients with transient ischemic attack over five months. **Tools:** three tools were used; tool I Patients' structured interviewing questionnaire , tool II Risk assessment data and tool III Clinical assessment data . **Results:** the result of this study revealed that the total mean score regarding patients' knowledge was (0.0 ± 0.0) in pre-educational sessions and improved immediately and on the 2nd-day post educational sessions implementation to (8.0 ± 0.0 and8.0 ± 0.0 ), respectively. Regarding patients' warning signs and risk factors of stroke, It revealed that there was highly statistically significant differences between pre and post educational sessions implementation with high significant differences (p= <0.001*). **Conclusion:** The patient's knowledge about transient ischemic attack and stroke prevention significantly improved post-educational sessions, as well as lowered their risk assessment for stroke. **Recommendations:** Ongoing educational sessions are needed for patients with transient ischemic attacks and providing patient's necessary instructions about modifying their lifestyle using Arabic booklets.

***Keywords***: Educational sessions, Stroke prevention, Transient ischemic attack.

## Introduction

A transient ischemic attack (TIA) is a warning signs of stroke with similar symptoms. It usually lasts only a few minutes and recovers within 24 hours and doesn't cause permanent damage. About 1 in 3 people who have a TIA will eventually have a stroke, with about half occurring within a year after the TIA. It can serve as both a warning of a future stroke and an opportunity to prevent it (**Amin *et al.,2023).***

The clinical features of TIA begin suddenly and depend on the part of the brain that becomes ischemic, it is temporary and reversible, and the most common symptoms are muscle weakness, pain often occurring on one part of the body, as well as unsteady walking or affected gait. They may also have slurring of speech, difficulty speaking or blurring of the vision, temporary blindness in one eye, and lack of coordination or dizziness. The intensity of the symptoms may range from mild to severe **(Wong *et al.,2023).***

Prevention of TIA depends on actions that can be taken including a primary care provider yearly for checkup, this can detect symptomless concerns like high blood pressure and Type 2 diabetes sooner, reach and maintain a healthy weight, and manage and modify a diet that the primary care provider can guide to the ideal diet as well as stop smoking and avoid nonmedical drug use. On the other hand, manage any chronic conditions, such as high blood pressure, Type 2 diabetes, and high cholesterol **(Heran *et al.,2024)*.**

Nurses play an important role in patient care. They frequently are on the front line regarding high-risk groups to prevent TIA through educating the patient about signs, symptoms, modifiable risk factors, medication, and lifestyle changes**.** Primary prevention focuses on educating high-risk patients to understand the significance of a healthy lifestyle is important to achieve the benefits of management. Lacking knowledge among high-risk patients may affect

lifestyle modification and may going patients to TIA and stroke **(Woo *et al.,2023)*.**

**Significance of the study**

Transient ischemic attack (TIA) may not seem significant to patients, but it should be considered a true medical emergency. It is often a warning of an impending stroke**( Fonseca et al.,2021).** According to the World Health Organization, around 15 million people, worldwide, suffer from stroke each year, five million die and another five million are permanently disabled. Four out of five strokes can occur in low- and middle-income countries that can least afford to manage the consequences of this disease **(Kaur et al.,2022).** TIA carries a high short-term risk of stroke and about one-third of ischemic stroke cases are preceded by a TIA **(Verhoeven et al.,2022).**

There are a limited number of studies that have addressed the epidemiology of stroke in Egypt with no accurate national estimate of prevalence or incidence. The overall crude prevalence rate of stroke is high (963/100,000 inhabitants), and the annual incidence of stroke in Egypt has been roughly estimated to be 150,000–210,000 **(Aref et al.,2021).**

According to the annual report of the neurological department at Benha University Hospital (2022), the total number of patients admitted to the neurological department was 988 patients, about 500 patients with stroke 200 with TIA, and 288 with another neurologic disease **(Benha University Hospital Statistical Office, 2022).** So this study aimed to evaluate the effect of educational sessions about stroke prevention among patients with Transient Ischemic Attack (TIA).

**Aim of the study:**

The study aimed to evaluate the effect of educational sessions about stroke prevention among patients with Transient Ischemic Attack (TIA).

**Research hypotheses:**

**H1-**The knowledge of patients have TIA concerning stroke prevention could be improved significantly post educational sessions implementation than before.

**H2-**The risk assessment of the patients have TIA could be decreased significantly post educational sessions implementation than before.

**Subject and Methods**

**Research design:**

A quasi-experimental pre and post-intervention comparison research design was implemented to achieve the aim of the present study.

**Study setting:**

This study was conducted at the Neurological Department and outpatient clinic at Benha University Hospital, Qaliobia, Egypt. The Neurological Department lies on the seventh floor of the medical building; it consists of two rooms; each room includes sex beds. The outpatient clinic lies on the first floor and consists of one room.

**Sample:**

purposive sample of (133) patients from both sexes who conducted at the Neurological Department and outpatient clinic at Benha University Hospital, Qaliobia, Egypt., their age ranged from 21- 65 years old. and willing to participate in the study.

**Tools for data collection**

Three tools were used to collect data for this study:

**Tool I**: **A Structure Interviewing Questionnaire for TIA Patients:**

It was designed by the researcher based on (**Park, 2023 and Sharma et al., 2022**) and aimed to assess patients' sociodemographic characteristics and history related to their medical data. It was collected by the researcher and included the following parts:

**Part I**: **Patients' Socio-Demographic Characteristics.** It aimed to assess socio-demographic characteristics data, it included 7 questions such as age, gender, occupation, educational level, residence, and marital status.

**Part II: Patients' medical history.**It aimed to assess the past and present medical history data, it included 6 questions related to comorbidity disease, previous hospitalization or number of hospital admissions, family history, previous medications, investigation, and dependency level.

**Part III**: **Patients' Knowledge Assessment Questionnaire:** It aimed to assess patients' knowledge related to TIA and methods of prevention, it included 16 open-ended questions under four main items:

-General knowledge about brain structure included 3 questions concerning definition, components, and function of the brain.

-Knowledge regarding TIA included 4 questions concerning the concept, warning signs, risk factors, and signs of transient ischemic attack.
-The knowledge about stroke included 5 questions concerning the definition, causes, types, signs and symptoms and investigation.

- The preventive measures should be taken by the TIA patients including 4 questions concerned with lifestyle changes, healthy dietary intake, benefits of physical activities, and controlling of chronic condition.

**Scoring System of Patients' Knowledge:**
knowledge items were scored as (0) for don't know, (1) for know the main items, and (2) for good answer. The total knowledge score was 32 which was summated and converted into percentages and classified into three levels:

- < 60 of the total score was considered poor knowledge,
- ≥ 60 - <80% of the total score was considered satisfactory level
- ≥ 80 % of the total score was concerned with a good level of knowledge

**Tool II**: **Risk assessment data :**It was adopted from **(Barken, 2005)** and aimed to assess the patients who are at risk of stroke. It included the following parts:

**Part 1: Warning Signs and Symptoms of Transient Ischemic Attack (TIA):** It aimed to assess the warning signs and symptoms that the patient might experience and to save a life from stroke, it may be determined by two of features as follows:

1. **A BE. FAST Scale Assessment**

**Scoring System:**

**BE – FAST items were scored as (0) for no answer, (1) for yes answer. The total score was " 6 ".**

***** The increase in the score, was concerned with the high-risk stroke and a decrease in the score was concerned with the low-risk stroke.

**2. Clinical Reporting Symptoms Assessment:** The patients were asked by the researcher for sudden frequent complaints of numbness, severe headache, blurred vision, difficulty in understanding others, and vertigo. The patients' response was One concerned with "Yes" as the symptom was present or Zero was concerned with "No" as the symptom was absent.

**Part 2: Risk Factors of Stroke Assessment:** It was aimed to determine and detect risk at the (TIA) patient, level to prevent stroke, which is classified as high risk, cautious, and low risk. It comprised the items about various risks and lifestyle as a risk factor for TIA. It included: blood pressure, cholesterol, Diabetes, Smoking, Atrial Fibrillation, Weight, Exercise, and Family History.

**Scoring System:**

- A score of 3 or more was concerned with a High Risk for stroke).
- Caution number from 4 to 6.
- Score from 6 to 8 concerned low controlling risk for stroke.

***** The decrease in the score, was concerned with the high-risk stroke and an increase in the score was concerned with the low-risk stroke.

**Tool III: Clinical Data Assessment: (Sehgal et al.,2023, Panasiuk et al.,2023 and Jia et al.,2023)** were observed by the researcher and through the patient's records to determine the risk factors level for TIA.

**Method**

**I-Administrative design:**

Official permission was obtained from the Dean of the Faculty of Nursing, Benha University. By the submission of a formal letter from the Dean of the Faculty of Nursing at Benha University, the researcher obtained the agreement from the Director of the Neurological Department at Benha University Hospital.

**Ethical considerations: ( Code . N REC-MSN-P65 )**

The ethical research considerations in the study included the following:

•The study approval was obtained from the Ethical Committee of the Nursing Faculty before initiating the study work.

•The researcher clarified the purpose and aim of the study to patients included in the study before data collection and obtained their oral consent.

•The researcher was assured of maintaining anonymity and confidentiality of data.

•The patients were informed that they were allowed to choose their participation in the study and they have the right to withdraw from the study at any time.

**II- Preparatory phase:**

This phase included reviewing of literature of various aspects for this study in order to develop the appropriate tools for data collection according to supervisors' guidance and experts' opinions. The researcher developed stroke prevention educational sessions according to the patient's initial assessment and translated it into the Arabic language. During this phase, the researcher also visited the study setting to be acquainted with the personnel and the setting,

The tools were tested by the following: -

**1- Validity and reliability :**

Tools validity: The face and content validity of the tools were checked through a jury consisting of five experts, four of them in the field of medical surgical nursing from the faculty of nursing, at Benha University and one expert in the field of the neurological department at Benha University Hospital. The experts reviewed the tools to check the relevancy, simplicity, clarity, comprehensiveness, and applicability of the questions. The consensus among experts regarding the questionnaire was 98 %, and the Structured interviewing questionnaire and Risk assessment data was 99 % for most items. Also, a designed educational session that covered all items related to the transient ischemic attack and stroke prevention patients' health outcomes based on recent current literature, was revised by the same experts then all required modifications were done consequently and the final form of the tools was used for data collection.

**Reliability of tools: Reliability Statistics**

In the present study, reliability was tested using Cronbach's alpha coefficient Reliability. The reliability scores of the tools of the knowledge questionnaire was( 0.889), warning Signs and Symptoms of Transient Ischemic Attack was(0.793 )and risk assessment too was (0.969)

## Pilot study

A pilot study was conducted on 10% of the study subjects (13 patients) in order to test the clarity and applicability of the study tools and program, also to estimate the time required for each tool to be filled by the researcher as well as to identify any possible obstacles that may hinder data collection. Based on the results of the pilot study, the necessary modifications were done for more applicable tools to collect data. The patients selected for the pilot study were excluded from the study subjects.

**III. Fieldwork:**

-Data collection of the current study was carried out through five months period from the beginning of September 2023 to the end of January 2024. It was collected according to the policy of the study setting. The researcher attended the setting three days (Saturday, Monday and Tuesday) per week during morning and afternoon shifts. Each interview took a time of about 30-45 minutes.

-Before data collection, the researcher welcomed each patient and informed them about the title, aims, tools, the study process and the outcomes of the study to obtain their approval and cooperation which is needed for conducting this study.

-The following phases were adjusted to achieve the aim of the current study; assessment, planning, implementation, and evaluation phases. As follows :

**Assessment phase:**

Data was collected in this phase once the researcher obtained patients' consent for the study. The questionnaire tool was filled by the researcher for all patients individually to assess their knowledge using tool I ( part 3) associated with their demographic characteristic and medical history (Parts 1 and 2). In addition to the risk assessment and clinical data assessment tools, it was observed by the researcher using tool II (parts 1, and 2) and tool III, respectively as a baseline data assessment pre implementing the educational sessions.

**Planning phase:**

Once the initial assessment was completed, a patient's educational sessions were developed and designed based on individual learning needs. The researcher set up a teaching plan covering general and specific objectives.

This educational session was developed from recent literature. It was revised and modified based on the experts' comments, to be implemented using various methods educational methods as explanation, and open group discussion. The educational sessions resources and facilities were allocated as printed material and location or site of session that best serves the learner. The researcher determined the timetable of sessions with the patients for starting educational sessions.

**Implementation phase:**

General and specific objectives of educational sessions were stated and implemented to satisfy the actual needs of the studied participants. It was achieved through 4 sessions and the duration of each session was one hour for a period of 3 days/week. Each session started with a summary of the previous session and the objectives of the new one. Take into consideration, the use of the Arabic language that suits the patient' educational level. During session, patients and researcher sits together in circle and take turns sharing. The motivation and reinforcement during sessions were used to enhance motivation for the sharing in the study. During sessions, every patient had an opportunity to ask questions and share information. Different methods of teaching were

used as modified lectures, and group discussions.

**Contents of each session:**

➢ 1st session: (introductory session) focused on an explanation of reasons and importance of the educational sessions and give an explanation about general information about brain function.

➢ 2nd session: included an explanation about: Definition of transient ischemic attack, signs and symptoms of TIA, warning signs of TIA, and risk factors of TIA.

➢ 3rd session: it's includes a period of discussion about: Definition the stroke, causes and types of stroke, signs and symptoms of stroke and diagnosis of stroke.

➢ 4th session: included explanation about: Lifestyle changes, healthy dietary intake, benefits of physical activities, and controlling of chronic condition.

-At the beginning of the first session, patients were oriented regarding the program contents, its purpose and impact on their condition, and expected outcomes. Patients were informed about the time of the next session at the end of the lecture.

-Each session started with a summary of what had been discussed in the previous session and the objectives of the new session, using simple Arabic language, also the session ended with a summary of its contents, and feedback was obtained from the patients to ensure that he/ she got the maximum benefit.

-Different teaching and learning methods were used as lectures of simplified instruction followed by discussion, Media for teaching included: a booklet and pictures. The colored booklet was given to each study to help them review and support teaching.

-At the end of all sessions, the researcher asked the studied patients about their opinion on the educational sessions and their benefits from the subject and ensured that they should follow all the instructions about the change their lifestyle and take considerations all the preventive measures to avoid TIA and stroke. The researcher informed the patients that they were evaluated by them .

**Evaluation phase:**

The researcher evaluated patients , knowledge immediately ,2nd day ,2$^{nd}$ week and 1st month post educational session implementation Also evaluated risk assessment and clinical data on 2nd day,2nd week and one month post educational session implementation.

**Statistical analysis**

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0**.** **(**Armonk, NY: IBM Corp**).**Qualitative data were described using number and percent. The **Shapiro-Wilk** test was used to verify the normality of distribution Quantitative data was described using mean & standard deviation. Significance of the obtained results was judged at the 5% level.

**The used tests were :Student t-test** for normally distributed quantitative variables, to compare between two studied groups , **F-test (ANOVA)** for normally distributed quantitative variables, to compare between more than two groups ,**Friedman test** for abnormally distributed quantitative variables, to compare between more than two periods **Cochran's test** for non-parametric test for binary response variable ,**Pearson coefficient** to correlate between two normally distributed quantitative variables, **Cronbach's Alpha** for reliability Statistics

**Results:**

**Table (1):** illustrates the socio-demographic characteristics of the studied patients. It reveals that 46.6% of studied patients were in the age category 40 - < 50 years with a mean age 46.26 ± 9.23, and 47.4% can read and write. Also, 57.1% of them were males and had technical work as well as, 94.7% were married and living in rural areas.

**Table (2):** shows the frequency distribution of the studied patients related to their medical history. It reveals that 67.7% of the TIA patient had a family history of TIA and 36.8% of them were hospitalized one before due to TIA. Concerning to their comorbidity disease, 62.4% of them had hypertension and were receive the antihypertensive drugs as well as all the patients who have diabetes mellitus 37.6 % were receive the oral hypoglycemic drugs also, 88.7% and 84.2 % of them performed CBC and brain CT before, respectively , and 89.5% of the studied patients were partially independent regarding to their daily live responsibilities .

**Table (3):** shows the frequency and percentage distribution of the studied patients and the significant difference according to their knowledge of pre and post-educational sessions implementation, it revealed that all (100 %) of the studied patients had a poor level of knowledge of pre-educational sessions implementation regarding the general concept of brain structure, concept of TIA, and stroke

information as well as , the preventive measures to avoid stroke. On the other hand, all (100 %) of the studied patients had a good level of knowledge about TIA and stroke immediately and on 2nd day post educational sessions implementation. but they decline in 2nd week and 1st month post-educational sessions implementation to become 78.9, 74.4, and 78.9, respectively. in addition to, all (100 %) the studied patients had a good level of knowledge regarding the preventive measures to avoid stroke immediately, 2nd day, 2nd week, and 1st-month post educational sessions implementation.

**Figure (1):** illustrates that the mean total knowledge score , it was noticed the overall patients' knowledge was 1.74 pre-educational session implementation, which increased immediately and 2nd the day, 2nd week and 1st month to become 30.85 and 30.28, 28. 71 and 28.23, respectively.

**Table (4):** shows frequency and percentage distribution of the studied patients regarding warning signs and symptoms of transient ischemic attack (TIA) pre and post educational sessions implementation. Regarding the Be fast, it reveals that 100% of the studied patients had problem in balance in pre and immediate post educational sessions and they improved in post 2nd day, 2nd week and 1st month to 78.9%, 41.4% and 58.6% respectively, On the other hand , regarding the other symptoms , it revealed that 100 % all of the studied patients had numbness problem in pre and post immediate educational sessions and they improved post 2nd day, 2nd week and 1st month of the educational sessions implementation to 63.2% , 83. 5% and 68.4% respectively. With highly statistically significant differences pre and post educational sessions implementation. with significant difference at <0.001. In addition to this table revealed that the total mean score regarding (be fast ) pre educational sessions implementation was 2.64 ± 0.99 and declined on 2nd week and 1st month to become 1.17 ± 0.99 and 0.77 ± 0.95 respectively , where it means improvement on the warning signs and symptoms of TIA .

**Figure (2:** illustrate that the Mean % score of the patients regarding Be Fast as warning signs and symptoms of transient ischemic attack (TIA) , was 43.98 % of total mean score pre educational session implementation , which decreased on 2nd day , 2nd week and 1st month post educational session implementation to become 40.35 , 19.55 and 12.91, respectively .

**Table (5)** shows that the mean score of BMI pre-educational session implementation was 28.81 ± 2.78 this score was slightly improved on 2nd day and 1st month post-educational session implementation to become 28.66 ± 2.88 , and 28.32 ± 3.00 respectively with statistically significant difference between BMI at 2nd day and at 1st month with p <0.001 . Regarding the total cholesterol level the mean score was 199.82 ± 40.21 pre educational session implementation, which improved on 2nd day , 2nd week and 1st month post-educational session implementation to become 184.14 ± 47.22 , 184.35 ± 47.03 and 176.35 ± 48.64, respectively.

**Table(6)**Shows statistically significant negative correlation between knowledge and warning signs and symptoms of transient ischemic attack, BMI, systolic pressure, blood glucose and total cholesterol pre educational sessions implementation as evidenced by (r=-0.301 ,p <0.001*, r=-0.221,p=0.010*,r=-0.202 ,p=0.020, r=-0.276 ,p <0.001* and r=-0.309, p <0.001*) respectively . While post educational sessions implementation , there was statistically significant negative correlation between knowledge and warning signs and symptoms of transient ischemic attack and HDL at (r=-0.639 ,p <0.001* and r=-0.171* , p=0.049*) respectively .

**Table (1): Frequency and percentage distribution of transient ischemic attack studied patients according to their socio demographic characteristics (n =133)**

| Personal characteristics | No. | % |
|---|---|---|
| Age (years) | | |
| 20-<30 | 14 | 10.5 |
| 40-<50 | 62 | 46.6 |
| 50-<60 | 57 | 42.9 |
| Mean ± SD. | 46.26 ± 9.23 | |
| Gender | | |
| Male | 76 | 57.1 |
| Female | 57 | 42.9 |
| Marital status | | |
| Married | 126 | 94.7 |
| Widow | 7 | 5.3 |
| Nature of Work | | |
| No work | 57 | 42.9 |
| Technical work | 76 | 57.1 |
| Educational Level | | |
| Can't read and write | 28 | 21.1 |
| Read and write | 63 | 47.4 |
| Secondary education | 42 | 31.6 |
| Residence | | |
| Rural | 126 | 94.7 |
| Urban | 7 | 5.3 |

**Table (2):Frequency and percentage distribution of the studied patients regarding their medical history (n=133).**

| Patients' medical history | No. | % |
|---|---|---|
| Comorbidity diseases ( chronic )# | | |
| None | 21 | 15.8 |
| Hypertension | 83 | 62.4 |
| Diabetes mellitus | 50 | 37.6 |
| Heart disease | 28 | 21.1 |
| Hyper cholesterol | 28 | 21.1 |
| Hepatitis C | 13 | 9.8 |
| Previous hospitalization due to TIA | | |
| No | 29 | 21.8 |
| Yes , once | 49 | 36.8 |
| Twice | 34 | 25.6 |
| Three times | 7 | 5.3 |
| Four times | 14 | 10.5 |
| Family history of TIA or stroke | | |
| No | 43 | 32.3 |
| Yes | 90 | 67.7 |
| Previous Medications# | | |
| Antiplatelet | 30 | 22.5 |
| Anticoagulant | 35 | 26.3 |
| Antihypertensive | 83 | 62.4 |
| Diuretics | 13 | 9.8 |
| Oral hypoglycemic drug | 50 | 37.6 |
| Antibiotics | 7 | 5.3 |
| Previous investigation# | | |
| Ultrasound | 49 | 36.8 |
| Brain CT | 112 | 84.2 |
| MRI | 77 | 57.9 |
| Echo | 14 | 10.5 |
| CBC | 118 | 88.7 |
| Blood glucose, | 1 | 0.8 |
| BL cholesterol test | 7 | 5.3 |
| Blood glucose, BL cholesterol test | 7 | 5.3 |
| Liver function test | 13 | 9.8 |

#: More than one answer

**Table (3): Frequency distribution of the studied patients and significant difference according to their knowledge pre and post educational session implementation (N=133).**

| Patient knowledge | Pre educational sessions | | | | | | Post educational sessions | | | | | | | | | | | | | | | | | | | | | | Sig. bet. Periods | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Immediately | | | | | | 2nd day | | | | | | 2nd week | | | | | | 1st month | | | | | | | | | |
| | Poor (< 60%) | | Average (60 - <80%) | | Good (≥ 80%) | | Poor (< 60%) | | Average (60 - <80%) | | Good (≥ 80%) | | Poor (< 60%) | | Average (60 - <80%) | | Good (≥ 80%) | | Poor (< 60%) | | Average (60 - <80%) | | Good (≥ 80%) | | Poor (< 60%) | | Average (60 - <80%) | | Good (≥ 80%) | | $p_1$ | $p_2$ | $p_3$ | $p_4$ | $p_5$ |
| | No | % | No | % | No | % | No | % | No | % | No | % | No | % | No | % | No | % | No | % | No | % | No | % | No | % | No | % | No | % | | | | | |
| I-General concept about brain structure | 133 | 100 | 0 | 0.0 | 0 | 0.0 | 34 | 25.6 | 0 | 0.0 | 99 | 74.4 | 34 | 25.6 | 30 | 22.6 | 69 | 51.9 | 84 | 63.2 | 0 | 0.0 | 49 | 36.8 | 28 | 21.1 | 83 | 62.4 | 22 | 16.5 | <0.001* | <0.001* | <0.001* | <0.001* | <0.001* |
| II-Concept of TIA | 133 | 100 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 133 | 100 | 0 | 0.0 | 0 | 0.0 | 133 | 100 | 0 | 0.0 | 28 | 21.1 | 105 | 78.9 | 0 | 0.0 | 28 | 21.1 | 105 | 78.9 | <0.001* | <0.001* | <0.001* | <0.001* | 0.030* |
| III- Stroke information | 133 | 100 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 133 | 100 | 0 | 0.0 | 0 | 0.0 | 133 | 100 | 0 | 0.0 | 34 | 25.6 | 99 | 74.4 | 0 | 0.0 | 28 | 21.1 | 105 | 78.9 | <0.001* | <0.001* | <0.001* | <0.001* | 0.030* |
| IV- Preventive measures to avoid stroke | 133 | 100 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 133 | 100 | 0 | 0.0 | 0 | 0.0 | 133 | 100 | 0 | 0.0 | 0 | 0.0 | 133 | 100 | 0 | 0.0 | 0 | 0.0 | 133 | 100 | <0.001* | <0.001* | <0.001* | <0.001* | 1.000 |
| **Overall** | **133** | **100** | **0** | **0.0** | **0** | **0.0** | **0** | **0.0** | **0** | **0.0** | **133** | **100** | **0** | **0.0** | **0** | **0.0** | **133** | **100** | **0** | **0.0** | **0** | **0.0** | **133** | **100** | **0** | **0.0** | **28** | **21.1** | **105** | **78.9** | **<0.001*** | **<0.001*** | **<0.001*** | **<0.001*** | **0.030*** |

**Fr: Friedman test**

**p1: p value for comparing between Pre and immediately**

**p2: p value for comparing between Pre and 2nd day**

**p3: p value for comparing between Pre and 2nd week**

**p4: p value for comparing between Pre and 1st month**

**p5: p value for comparing between immediately and 1st month**

***: Statistically significant at p ≤ 0.05**

**Table (4): Frequency and percentage distribution of patients regarding warning signs and symptoms of transient ischemic attack (TIA): (No. = 133) and it significant difference pre and post-educational session implementation.**

| Warning signs and symptoms of transient ischemic attack (TIA) | Pre educational sessions | | | | Post educational sessions | | | | | | | | | | | | Sig. bet. Periods | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2nd day | | | | 2nd week | | | | 1st month | | | | | | | |
| | No | | Yes | | No | | Yes | | No | | Yes | | No | | Yes | | $p_1$ | $p_2$ | $p_3$ | $p_4$ |
| | No | % | No | % | No | % | No | % | No | % | No | % | No | % | No | % | | | | |
| **Be Fast** | | | | | | | | | | | | | | | | | | | | |
| Balance | 0 | 0.0 | 133 | 100.0 | 28 | 21.1 | 105 | 78.9 | 55 | 41.4 | 78 | 58.6 | 78 | 58.6 | 55 | 41.4 | 0.008* | <0.001* | <0.001* | <0.001* |
| Eye | 112 | 84.2 | 21 | 15.8 | 133 | 100.0 | 0 | 0.0 | 133 | 100.0 | 0 | 0.0 | 133 | 100.0 | 0 | 0.0 | 0.046* | 0.046* | 0.046* | 1.000 |
| Face | 104 | 78.2 | 29 | 21.8 | 111 | 83.5 | 22 | 16.5 | 133 | 100.0 | 0 | 0.0 | 133 | 100.0 | 0 | 0.0 | 0.506 | 0.006* | 0.006* | 0.037* |
| Arm | 1 | 0.8 | 132 | 99.2 | 1 | 0.8 | 132 | 99.2 | 55 | 41.4 | 78 | 58.6 | 85 | 63.9 | 48 | 36.1 | 1.000 | <0.001* | <0.001* | <0.001* |
| Speech | 97 | 72.9 | 36 | 27.1 | 70 | 52.6 | 63 | 47.4 | 133 | 100.0 | 0 | 0.0 | 133 | 100.0 | 0 | 0.0 | 0.010* | 0.001* | 0.001* | <0.001* |
| Time | 133 | 100.0 | 0 | 0.0 | 133 | 100.0 | 0 | 0.0 | 133 | 100.0 | 0 | 0.0 | 133 | 100.0 | 0 | 0.0 | – | – | – | – |
| **Total score (mean ± SD.) (0 – 6)** | 2.64 ± 0.99 | | | | 2.42 ± 0.50 | | | | 1.17 ± 0.99 | | | | 0.77 ± 0.95 | | | | 0.224 | <0.001* | <0.001* | <0.001* |
| **Clinical reporting symptoms** | | | | | | | | | | | | | | | | | | | | |
| Numbness | 0 | 0.0 | 133 | 100.0 | 49 | 36.8 | 84 | 63.2 | 22 | 16.5 | 111 | 83.5 | 42 | 31.6 | 91 | 68.4 | <0.001* | 0.037* | <0.001* | 0.506 |
| Severe headache | 0 | 0.0 | 133 | 100.0 | 104 | 78.2 | 29 | 21.8 | 133 | 100.0 | 0 | 0.0 | 133 | 100.0 | 0 | 0.0 | <0.001* | <0.001* | <0.001* | 0.006* |
| Blurred vision | 112 | 84.2 | 21 | 15.8 | 133 | 100.0 | 0 | 0.0 | 133 | 100.0 | 0 | 0.0 | 133 | 100.0 | 0 | 0.0 | 0.046* | 0.046* | 0.046* | 1.000 |
| Difficult in understanding | 97 | 72.9 | 36 | 27.1 | 104 | 78.2 | 29 | 21.8 | 133 | 100.0 | 0 | 0.0 | 133 | 100.0 | 0 | 0.0 | 0.506 | 0.001* | 0.001* | 0.006* |
| Vertigo | 0 | 0.0 | 133 | 100.0 | 1 | 0.8 | 132 | 99.2 | 0 | 0.0 | 133 | 100.0 | 7 | 5.3 | 126 | 94.7 | 0.924 | 1.000 | 0.506 | 0.569 |
| **Total score (mean ± SD.) (0 – 5)** | 3.43 ± 0.68 | | | | 2.06 ± 1.11 | | | | 1.83 ± 0.37 | | | | 1.63 ± 0.58 | | | | <0.001* | <0.001* | <0.001* | <0.001* |

**SD: Standard deviation** **Q: Cochran's test**

**F: F test (ANOVA) with repeated measures**

$p_1$: p value for comparing between **Pre** and **2nd day**

$p_2$: p value for comparing between **Pre** and **2nd week**

$p_3$: p value for comparing between **Pre and 1st month**

$p_5$: p value for comparing between **2nd day and 1st month** ***: Statistically significant at $p \leq 0.05$**

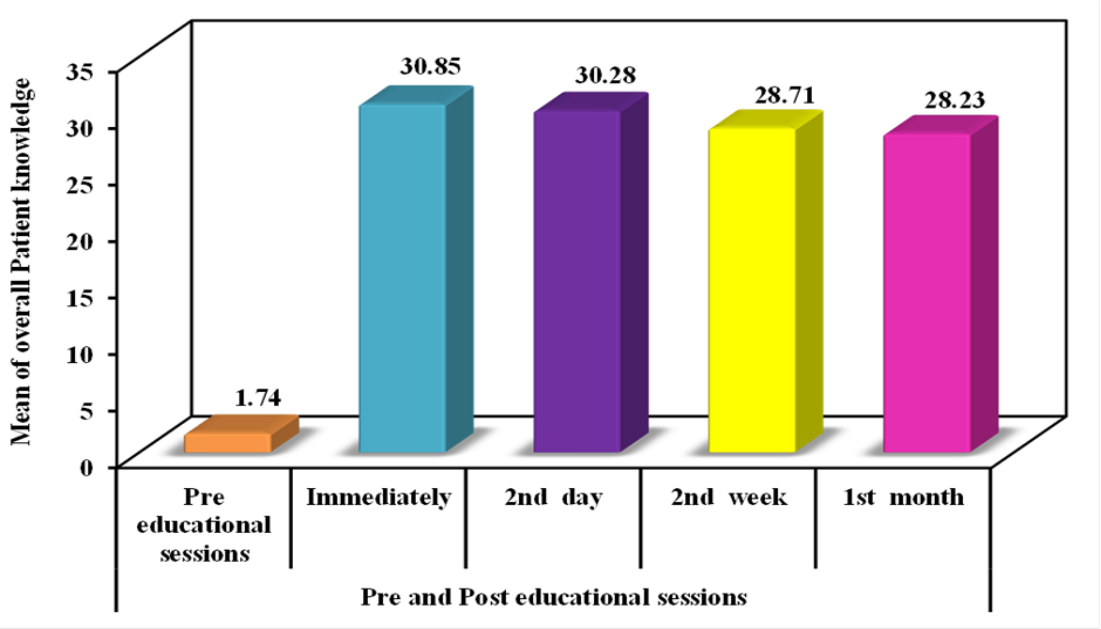


**Figure 1): Mean total knowledge score of TIA patients pre and post-educational session implementation. (n = 133).**

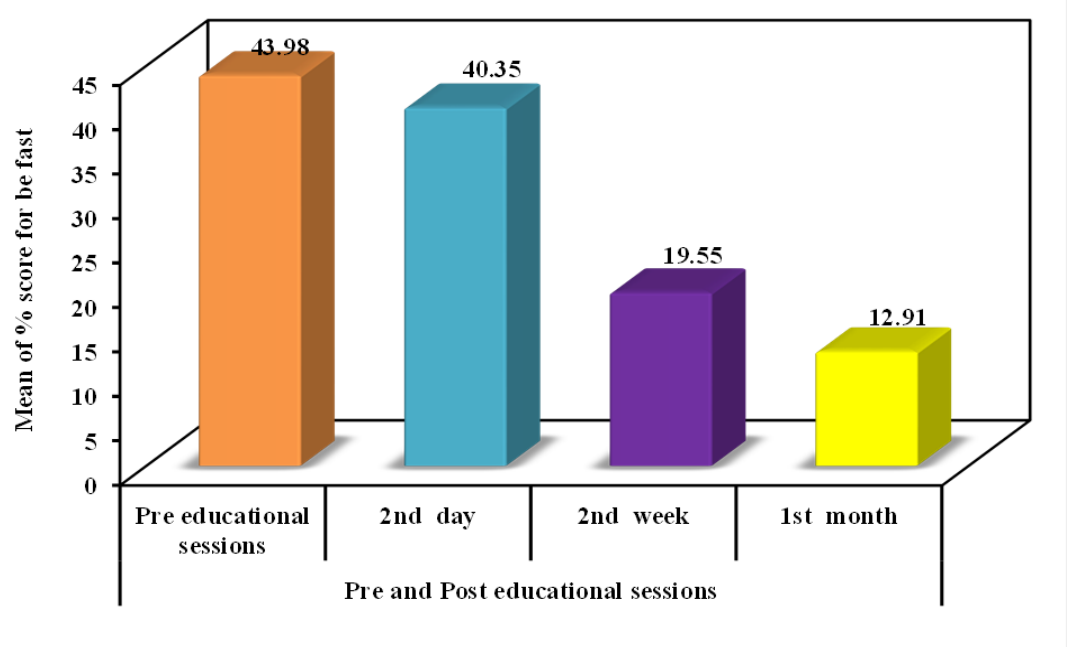


**Figure (2)Mean % score of the TIA patients warning signs and symptoms in Be Fast (n = 133)**

**Table (5): Distribution of the studied patients according to clinical assessment data Pre and post-educational sessions implementation (n=133)**

| Clinical assessment data | Pre educational sessions | Post educational sessions | | | Sig. bet. Periods | | | |
|---|---|---|---|---|---|---|---|---|
| | | 2nd day | 2nd week | 1st month | | | | |
| | Mean ± SD. | Mean ± SD. | Mean ± SD. | Mean ± SD. | $p_1$ | $p_2$ | $p_3$ | $p_4$ |
| **1-** BMI | 28.81 ± 2.78 | 28.66 ± 2.88 | 28.70 ± 2.90 | 28.32 ± 3.00 | 1.000 | 1.000 | 0.002* | <0.001* |
| **2- Blood pressure** | | | | | | | | |
| Systolic | 130.0 ± 16.12 | 131.58 ± 15.62 | 132.63 ± 16.48 | 128.42 ± 16.12 | 1.000 | 0.195 | 1.000 | <0.001* |
| Diastolic | 82.29 ± 9.04 | 84.40 ± 8.37 | 84.92 ± 8.85 | 82.29 ± 8.58 | 0.003* | <0.001* | 1.000 | <0.001* |
| **3- Blood glucose** | 123.15 ± 62.0 | 125.89 ± 65.11 | 124.83 ± 65.72 | 125.31 ± 65.77 | 1.000 | 1.000 | 1.000 | 1.000 |
| **4- Cholesterol** | | | | | | | | |
| HDL | 52.01 ± 15.08 | 55.38 ± 14.60 | 50.64 ± 12.43 | 54.77 ± 10.80 | 0.172 | 1.000 | 0.036* | 1.000 |
| LDL | 133.29 ± 21.50 | 130.77 ± 16.98 | 136.03 ± 18.36 | 128.68 ± 16.29 | 0.156 | 0.236 | <0.001* | 0.004* |
| Total cholesterol | 199.82 ± 40.21 | 184.14 ± 47.22 | 184.35` ± 47.03 | 176.35 ± 48.64 | <0.001* | <0.001* | <0.001* | <0.001* |

**Table (8): Correlation between knowledge and warning signs and symptoms and clinical assessment data Pre and post-educational sessions implementation (n= 133)**

| Variables | Knowledge | | | |
|---|---|---|---|---|
| | Pre | | Post (average) | |
| | r | P | R | p |
| **Warning signs and symptoms of transient ischemic attack (TIA)** | | | | |
| Be Fast | -0.226* | 0.009* | -0.639* | <0.001* |
| Clinical reporting symptoms | -0.301* | <0.001* | -0.156 | 0.074 |
| **Risk Factor** | -0.214* | 0.013* | -0.017 | 0.846 |
| **Clinical assessment data** | | | | |
| **1-** BMI | -0.221* | 0.010* | -0.030 | 0.729 |
| **2- Blood pressure** | | | | |
| Systolic | -0.202* | 0.020* | -0.028 | 0.749 |
| Diastolic | -0.080 | 0.363 | -0.132 | 0.131 |
| **3- Blood glucose** | -0.276* | 0.001* | -0.166 | 0.056 |
| **4- Cholesterol** | | | | |
| HDL | -0.115 | 0.186 | -0.171* | 0.049* |
| LDL | -0.019 | 0.832 | 0.084 | 0.334 |
| Total cholesterol | -0.309* | <0.001* | -0.041 | 0.638 |

**Discussion:**

Regarding age, the current study revealed that more than one third of the studied patients were recorded within age group of forty to less than fifty years old. From the researcher's point of view this result may be due to degeneration changes in the brain, with aging effecting of both cerebral micro- and macro-circulations undergo structural and functional alterations. As regard to gender, the current study results showed that more than half of the studied patients were males. From researcher point of view, that might be due to the influence of gender on stroke risk and outcome changes across the lifespan with

occupation responsibility, smoking and drinking are risk factors for stroke in males. Concerning marital status, the result of the current study revealed that most of the studied patients were married. Concerning the nature of the work, the results of the current study revealed that more than half of the studied patients were technical workers. From the researcher's point of view, that might be due to the stress of working life that increases the risk of the diseases. As regard to the educational level, the current study showed that approximately half of the studied patients were read and write. This result may be due to the most of the patients were lived in rural area, in her people preferred to work in the agriculture field better than another. Obviously, the majority of the studied patients were live in rural areas. This may be due to the study subjects were taken from Benha university hospital which serve the surrounding areas and majority of them are rural. This result is in the same line with a study by ***Vinding et al., (2023)*** about " Long-Term Incidence of Ischemic Stroke After Transient Ischemic Attack ", it showed that the age of more than half of the studied patients was recorded between forty to less than fifty years. This finding is in line with a study by ***Ospel et al., (2023)*** about " Sex and gender differences in stroke and their practical implications in acute care " and reported that the majority of the studied patients were males. This finding is supported by a study of ***Lavallée et al., (2023)*** about " Underlying Causes of TIA and Minor Ischemic Stroke and Risk of Major Vascular Events " who reported that the majority of the studied groups were married.

**Concerning Medical history of the studied patients ,** Concerning comorbidity diseases, the current study results showed that nearly three quarters of the studied patients had chronic disease. Regarding previous hospitalization due to TIA, the findings of the current study revealed that more than one third of the studied patients were hospitalized previously once due to TIA . From the researcher point of view, this finding may be due to approximately half of the studied patients were read and write, as they had poor knowledge about their disease and importance of follow-up which lead to their repeated admission to the hospital. As regards family history of TIA or stroke, the current study revealed that two-thirds of the studied patients had a family history. From the researcher's point of view, this finding may be attributed to heredity factor that is considered a non-modifiable risk factor for TIA and stroke. Considering prescribed Previous Medications, the current study revealed that nearly three quarters of the studied patients had been taken the anticoagulant drugs. As regards performed investigation, the current study revealed that the majority of the studied patients were made (CT of the brain). From the researcher point of view, it may be attributed to that CT considered the most significant and reliable tool for assessing TIA and stroke pathology, which can show areas of abnormalities in the brain, and can help determine if these areas are caused by insufficient blood flow (ischemic stroke), a ruptured blood vessel (hemorrhage), or another issue entirely. **Regarding Dependency level in ADLs** since the onset of TIA, the current study revealed that most of the studied patients are partially independent. From the researcher's point of view, it may be due to the patients having a TIA may stumble or lose balance or coordination or afraid of the unknown.

This finding is consistent with a study was done by ***Lavallée et al., (2023)*** and reported that most of the studied patients had associated disorder. This finding is congruent with a study conducted by ***Amin et al., (2023)*** and reported that most of the studied patients had associated disorders.

This finding is supported by ***Hart et al., (2024)*** in a study about " Differences in Receipt of Neurologist Evaluation During Hospitalization for Ischemic Stroke by Race, Sex, Age, and Region " and stated that the majority of the studied patients were hospitalized at least once. This result is inconsistent with a study done by ***Vinding et al., (2023)*** which stated that the majority of the studied patients had no previous hospitalization due to TIA.

***Concerning patients' knowledge assessment pre and post educational sessions implementation***, Concerning patient information about General concept of brain structure , the current study revealed that all of the studied patients had poor knowledge pre educational implementation , while there were improving in their knowledge post educational implementation . Concerning patient information about the general concept of brain structure, the current study revealed that all of the studied patients had poor knowledge of pre-educational sessions implementation, while there was an improvement in their knowledge post-educational session implementation. These findings are congruent with ***Zhong et al., (2020)*** who conducted a study titled " Recognition of stroke-related knowledge among community residents and the improvement after intensive health education" and found that more than half of the studied subjects didn't know about the general concept of brain structure and stroke.

***Regarding patient information about TIA,*** the current study showed that all of the studied patients had poor level of knowledge regarding TIA pre educational sessions implementation while immediately and 2$^{nd}$ day post session implementation, all of them had good information regarding the same

items, this might be attributed to the effectiveness of the educational sessions and simplified information's which were presented in the educational booklet. This study finding agrees with ***Smith et al., (2024)*** who studied about " Atrial Fibrillation Detection and Load: Knowledge Gaps Related to Stroke Prevention." and who revealed that most of studied patients had poor knowledge pre educational strategy.

***Concerning patients' information about stroke***, the current study revealed that all of the studied patient's information about stroke had poor knowledge at pre educational sessions implementation and improved immediate and at 2nd day post educational session implementation, This finding was agreed with ***Xiuyun et al., (2020)*** who conduct study entitled " Education and stroke: evidence from epidemiology and Mendelian randomization study "and showed that more than three quarters of the studied patients have had poor knowledge about stroke information pre implementation of the guidelines, which elevated to almost all of the studied patient had good knowledge regarding stroke instructions post implementation of guidelines.

***Concerning patients' information about the preventive measures to avoid stroke***, the current study revealed that all of the studied patients' information about preventive measures of stroke had poor level of knowledge at pre educational sessions implementation and improved immediate post ,2nd day, 2nd week and 1st month post educational session implementation. This finding was agreed with ***Kleindorfer et al., (2021)*** who conduct study entitled " guideline for the prevention of stroke in patients with stroke and transient ischemic attack "and showed that most of the studied patients had poor knowledge about stroke pre implementation of the guidelines, which elevated to almost all of the studied patient had good knowledge regarding stroke instructions post implementation of guidelines.

This study finding agrees with ***Ezunu et al., (2024)*** who studied about " Exploring the Primary Stroke Preventive Strategies in Sub-Saharan Africa." and revealed that most of studied patients had poor knowledge about preventive measures pre educational strategy. The study findings are in the same line with ***Ahmadi et al., (2020)*** who conduct study about " A support program for secondary prevention in patients with transient ischemic attack and minor stroke " and reported that there were highly statistically significance differences regarding patients' knowledge about the preventive measures pre and post educational program.

***Concerning warning signs and symptoms of transient ischemic attack (TIA) pre and post educational sessions implementation .***

Concerning warning signs and symptoms of TIA (Be Fast). The current study result showed that all of the studied patients had problems in balance in pre and immediate post-educational sessions, from the researcher's point of view this may be due to that a TIA or stroke stems from decreased blood flow located in one particular blood vessel in the brain. Therefore, the effects are most likely to be localized to a specific brain function, such as speech or vision, or to cause isolated weakness in one limb or side of the body, but the improvement on 2nd day, 2nd week and 1st month post educational session implementation was noted . The result is in the same line with study by ***Syed et al., (2023)*** about" Evaluation of knowledge of risk factors and warning signs of stroke." who revealed that there was highly significant improvement in warning signs of stroke post educational strategy among the studied patients.

This result is also agree with a study was done by ***Soto-Cámara et al., (2020)*** about" Knowledge on signs and risk factors in stroke patients. "Showed that there was significant improvement in the warning signs and symptoms among the studied patients post educational sessions.

***Concerning Patients' Clinical Assessment Data pre and post-educational sessions implementation:***

Regarding patients' clinical assessment data, the current study showed that there were high statistically significant differences regarding the items of clinical assessment data such as BMI, blood pressure, blood glucose, and cholesterol level pre and post-educational sessions implementation, from the researcher's point of view this may be due to that the patient needs to know more knowledge about the relation between BMI and stroke, Being overweight is one of the top ten risk factors for stroke. This is because carrying too much weight increases the risk of high blood pressure, heart disease, high cholesterol and type 2 diabetes which all contribute to higher stroke risk. So, post-educational sessions implementation, this led to an improvement in the patient's exposure to risk factors that lead to a stroke. Maintaining a healthy weight will help to reduce the risk of stroke. This finding is in agreement with a study conducted by ***Afrin et al., (2023)*** entitled " Effectiveness of a Health Education Program for Patients Who Had a Stroke and Their Caregivers by Controlling Modifiable Risk Factors to Reduce Stroke Recurrence in a Tertiary Hospital in Bangladesh" and stated that there were high statistically significant differences regarding the clinical data among the studied patients post educational program implementation.

Also, this finding is in the same line with a study conducted by ***Guo et al., (2023)*** entitled "Effectiveness of health management among

individuals at high risk of stroke" which revealed that there were high statistically significant differences in the rates of hypertension, hyperglycemia, and obesity after the intervention.

***Concerning the correlation between knowledge, warning signs, risk of stroke, and clinical assessment data pre and post-educational sessions implementation,*** it revealed that there was a statistically significant negative correlation between knowledge with their age, warning signs, and symptoms of transient ischemic attack, BMI, systolic pressure, blood glucose and total cholesterol pre educational sessions implementation, while post educational sessions implementation, there was statistically significant negative correlation between knowledge with only their warning signs and symptoms of transient ischemic attack and diastolic pressure. This result is in agreement with a study done by **Safwan et al., (2024)** about " Assessing the Efficacy of an Educational Video on Stroke Knowledge in Lebanon" They reported that there was a statistically significant negative correlation between knowledge and warning signs and symptoms of stroke, blood pressure, blood glucose and total cholesterol.

## Conclusion

The patients with transient ischemic attacks had significantly improved knowledge levels after implementing educational sessions. This improvement lowered the stroke risk assessment parameters, as indicated by the negative correlation between patients' knowledge of TIA and warning signs, symptoms, risk factors, and their clinical assessment. The study's findings supported the research hypotheses.

## Recommendations

1. The need for an effective educational program for high-risk groups about lifestyle modification to reduce TIA and stroke.
2. Ongoing educational sessions are needed for patients with transient ischemic attack and stroke.
3. Activating the educator role of the nurse in all health care centers to raise awareness among people about warning signs and symptoms of TIA and stroke.

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