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RESEARCH ARTICLE

KNOWLEDGE OF STROKE AMONG HYPERTENSIVE PATIENTS IN MOROCCO

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Abstract

Background: Cerebrovascular accidents are increasingly becoming a growing source of disability and death. However, it is possible to prevent them by raising awareness of their risk factors and ensuring early management of patients.
Aim: The study aims to determine the prevalence of stroke and study the knowledge of hypertensive patients regarding risk factors and warning signs at the health facilities in the province of Essaouira, Morocco.
Materials and Methods: This is a cross-sectional quantitative analytical study of hypertensive patients in the province of Essaouira, Morocco.
Results:455 participants took part in the study. 66.4% of patients were women, 50.5% were aged 60 or over, and 62.2% lived in urban areas. Most were married (64%) and had no formal education (58.2%). 7% of patients had a history of stroke diagnosed by a healthcare professional. 68% of participants identified numbness or weakness of the face, arm or leg as the main warning sign. 59.3% of participants had a low level of knowledge about stroke. Age, level of education, place of residence, social security coverage, history of stroke in the respondent, as well as in immediate family, relatives and neighbors, were significantly ($p<0.05$) related to the level of stroke knowledge.
Conclusion: The low level of knowledge about stroke among hypertensive patients highlights the need for increased awareness, both among these patients and in the community. It is therefore crucial to implement local education programs to encourage preventive behaviors and provide information on how to deal with the warning signs of stroke.

Introduction:-

Non-communicable diseases (NCDs) are currently the leading cause of death worldwide, and their prevalence is steadily increasing, as highlighted by the World Health Organization (WHO) in its report on the global situation of NCDs [1].These diseases account for 41 million deaths each year, or 74% of all deaths worldwide[1].

Cardiovascular disease is the leading cause of NCD-related deaths, causing 17.9 million deaths each year [1]. The Kingdom of Morocco is among the countries that have experienced an epidemiological transition with a particular interest in chronic diseases. This transition is due to a change in the age of the population, lifestyle changes (increased consumption of tobacco, alcohol, decreased physical activity) which tend to increase the prevalence of

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risk factors and therefore the risk of stroke[2]. The number of people suffering from stroke is increasing in parallel with the ageing population [3].Although AVS is considered to have multiple causes, it is mainly linked to contributing risk factors such as uncontrolled high blood pressure (HBP), diabetes, dyslipidemia, heart disease and other risk factors that can be modified. Of these, high blood pressure is the most prevalent, accounting for up to 75% of strokes[4]. HBP is the most common chronic disease in the world. Its prevalence varies from region to region [5]and represents a crucial risk factor for vascular complications, including the risk of stroke [6]. In addition, in Morocco, a study published in 2015 collected 665 hospitalizations for ischemic stroke at the service of neurology at the CHU (university hospital center) Mohammed VI of Marrakech. In 42.9% of cases, HBP was the most frequent risk factor, while smoking was present in 25.3% of patients, type 2 diabetes was present among 15.3% of individuals, and dyslipidemia affected 5.7% of them [7]. In view of these findings, and despite the rapid evolution in the use of intravenous thrombolysis in recent years in the countries of the Middle East and North Africa [8]. The average time between the onset of symptoms of an ischemic stroke and the arrival of patients in a stroke center or emergency service in Morocco remains very long[2]. This could be the result of a lack of knowledge about the early precursor signs of ischemic stroke [9].Thus, a lack of knowledge of risk factors, early symptoms, and emergency therapeutic interventions has been identified as a significant cause of increased stroke mortality and morbidity[10]. Furthermore, this lack of knowledge has been identified as one of the main barriers to accessing quality stroke care in Africa, also impacting pre-hospital delays [11]. Numerous studies around the world have shown that the level of knowledge about stroke is low among patients and the community [9,12,13].So, increased awareness of risk factors, warning signs, and strategies to prevent stroke in high-risk populations could help reduce the incidence of stroke and reduce pre-hospital care intervention time [12,14]. In our context and to our knowledge, no preliminary studies have been undertaken to study the degree of knowledge of hypertensive patients about stroke. Therefore, this current investigation represents a first initiative in the province of Essaouira to assess the level of knowledge of hypertensive patients about stroke, as well as the associated factors, in the province of Essaouira in Morocco.

Material and Methods:-

Type of stady

This is a cross-cutting study for descriptive, analytical, and quantitative purposes at the first level. It aims to describe the knowledge of hypertensive patients about stroke at the level of the province of Essaouira in the Marrakech-Safi region. The province of Essaouira is located on the Atlantic Ocean and had a population of 77,966 in 2014.

Stady environment

The study was conducted at the level of the urban and rural primary health care facilities (PHCF) and at the provincial hospital center (PHC) of Essaouira.

Study population and sampling

The target population of our study concerns all hypertensive patients in the health centers in the study area as well as hospital hypertension at the level of CHP in Essaouira.

The sample size was calculated on the basis of an error range of 5.0%, a 95% confidence interval (IC) for a total population of 77,966 in the province of Essaouira, and an anticipated proportion of the population with a 50% knowledge deficit on stroke. For example, the minimum sample size required for the study was 385 people, to be more precise, a sample of approximately 455 participants was included.

Convenience sampling was adopted for the recruitment of hypertensive patients at the health facilities at the study site.

Criteria for inclusion and exclusion

The studyincluded people with high blood pressure aged 18 years and olderwhovisitedhealthfacilitiesselected for the research. On the other hand, the foreign population (non-Moroccan) and health personnel wereexcluded.

Data collection

A questionnaire was developed to explore the objectives of the study. The first part is reserved for socio-demographic characteristics (age, sex, civil status, educational level, place of residence, socio-economic level, family income, profession, body mass index, regular exercise, medical history and associated comorbidities (diabetes, hypercholesterolemia, heart disease), toxic habits (smoking, alcohol consumption), and history of stroke.

A second part includes questions exploring general knowledge about stroke, its risk factors, and the precursor signs of stroke. The questionnaire was reviewed and validated by two experienced consultants. A pilot study was conducted before data collection to refine the questionnaire. The data were collected in April and May 2024.

Data analysis

The data was processed using the SPSS software for Windows (version 25.0; SPSS Inc., Chicago, IL). Descriptive statistical analyses were carried out on the sample. For data analysis, the variables were presented as frequency, percentage, average, and ± standard deviation (ET). The Chi square test ($\chi 2$), or Fisher's exact test, was performed according to their specific application conditions to detect differences in the ratio of categorical variables between two groups (the group of respondents with a low level of knowledge about stroke and those with a high degree of knowledge about stroke). A p value less than 0.05 was considered to be of statistical significance.

Ethical considerations

The approval of the local health authorities was obtained from the provincial delegation of the Ministry of Health and Social Welfare (No. 5/2024). The participants' consent was obtained in the form of a section at the beginning of the questionnaire to consent to participating in the study. A statement was also added stating that the data will be confidential and will not be used for purposes other than the study.

Statement of funding

It's a self-funded study.

Results:-

Sociodemographic and health characteristics of the participants

Table 1 describes the characteristics of the participants. Of these, approximately 66.4% were women, 50.5% were 60 years of age or older, and 62.2% were living in urban areas. The majority were married (64%), and 58.2% were illiterate. In terms of income, 78% of the participants had a monthly family income equal to or less than the guaranteed minimum inter-professional wage (SMIS), 71.4% were unemployed, and 74.5% received health cover. Overweight, or obesity, was diagnosed in 39% of participants, while 52% had diabetes. Furthermore, 11% of them are smokers, and 4.5% drink alcohol. In addition, 81% of respondents did not exercise. As for the history of stroke, 7% of patients have been diagnosed with a stroke by a healthcare professional, and 14.5% report a history of stroke in their family, relatives, or neighbors.

Table 1:- Sociodemographic and health characteristics of the participants.

Variables		**Frequency**	**Pourcentage (%)**
Gender	Masculin	153	33.6
	Féminin	302	66.4
Age (years)	20-39	40	8.8
	40-59	185	40.7
	60 and over	230	50.5
Mean ±SD	46±8.2		
Place of residence	Urban	283	62.2
	Rural	172	37.8
Marital status	Single	45	9.9
	Maried	291	64.0
	Divorced	42	9.2
	Widow	77	16.9
Education level	Illiterate	265	58.2
	Primaryschool	134	29.8
	Secondary and more	55	12.0
Socio-economic status	Lessthan 3000 dirhams	355	78.0
	More than 3000 dirhams	100	22.0
Professional activities	Employee/Salary	34	7.5
	Travail indépendant	82	18.0
	Retirement	14	3.1

	Inactive	325	71.4
Health coverage	Yes	339	74.5
	No	116	25.5
Obesity or overweight	Yes	178	39.0
	No	277	61.0
Diabetes	Yes	218	48.0
	No	237	52.0
Regular physical activity	Yes	86	19.0
	No	369	81.0
Personal history of stroke	Yes	32	7.0
	No	423	93.0
History of stroke (family, close, neighbors)	Yes	66	14.5
	No	389	85.5
Smoking	Yes	50	11.0
	No	405	89.0
Alcoholism	Yes	22	4.8
	No	433	95.2
SD: Standard Deviation			

Overall knowledge of participants on stroke:

In the current study of participants' knowledge of stroke, 84.6% considered it a preventable disease, 86.2% considered it curable, and 80.2% considered it disabling.

With regard to knowledge of stroke risk factors, high blood pressure was recognized as the most frequently quoted risk factor by 82.6% of participants, followed by depression and stress (75.8%), heart disease (71.4%), personal history of stroke (51.5%), obesity and overweight (49.5%), and smoking (45%).

For the precursor signs of stroke, 41.3% of participants reported sudden numbness or weakness in the face, arm, or leg. Furthermore, 37% reported sudden dizziness accompanied by difficulty walking, while 32% reported loss of balance or coordination problems.

Table 2:- Overall knowledge of participants on stroke.

Variables	**Yes Frequency (%)**	**No Frequency (%)**
Notions about stroke		
A curable disease	392 (86.2)	63 (13.8)
A preventable disease	385 (84.6)	70 (15.4)
A disabling disease	365 (80.2)	90 (19.8)
Risk factors for stroke		
High blood pressure	376 (82.6)	79 (17.4)
Heart disease	325 (71.4)	130 (28.6)
Diabetes	165 (36.2)	290 (63.8)
Obesity and overweight	225 (49.5)	230 (50.5)
Hypercholesterolemia	92 (20.4)	363 (79.6)
Depression and stress	345 (75.8)	110 (24.2)
Smoking	205 (45.0)	250 (55.0)
Alcoholism	124 (27.3)	331 (72.7)
Personal history of stroke	235 (51.5)	270 (48.5)
Family history of stroke	192 (42.2)	263 (57.8)
Precursor signs and symptoms of a stroke		
Sudden numbness or weakness in face, arm or leg	188 (41.3)	267 (58.7)
Sudden confusion, difficulty expressing or understanding others	146 (32.0)	309 (68.0)
Sudden vision impairment in one eye or both eyes	175 (30.5)	280 (61.5)

Sudden dizziness, difficulty walking or lack of balance.	168 (37.0)	287 (63.0)
Sudden headaches of unknown origin.	138 (30.3)	317 (69.7)

Participants' level of knowledge of stroke and associated factors

Approximately 59 % of participants had a low level of knowledge about stroke. In connection with the factors associated with this level of knowledge, for the sociodemographic variables, there is a significant difference between the low- and high-level knowledge groups according to age (p = 0,007), middle-residence (p = 0,002), educational level (p < 0,001), marital status (P = 0,027), and social coverage (p<0,006).

With regard to health characteristics, a significant difference was found between the low knowledge group and the high knowledge group based on the notion of obesity or overweight (p = 0,034), personal history of stroke (p < 0,001), and history of stroke in the immediate family, relatives, and neighbors (p<0,001).

With regard to toxic habits, a significant difference was between the low knowledge group and the high knowledge group with regard to alcoholism (p = 0.021).

Furthermore, there was no significant difference between the group with a low level of knowledge about stroke and the group with high levels of knowledge about stroke based on other characteristics (gender, socio-economic level, smoking, p > 0.05) (Table 3).

Table 3:- Level of knowledge of stroke and associated factors.

Variables		**Frequency (%)**	**Low level of knowledge n(%)**	**High level of knowledge n(%)**	**p value**
Gender	Masculin	153 (33.6)	86 (18.8)	67 (14.8)	0.064 NS
	Féminin	302 (66,4)	184 (40.4)	118 (26.0)	
Age (years)	20-39	40 (8,8)	19 (2.8)	21 (6.0)	0.007**
	40-59	185 (40,7)	95 (20.9)	90 (19.8)	
	60 and over	230 (50,5)	156 (34.2)	74 (16.3)	
Place of residence	Urban	283 (62,2)	137 (30.2)	146 (32.0)	0.002**
	Rural	172 (37,8)	133 (29.2)	39 (8.6)	
Marital status	Single	164 (36.0)	109 (24.0)	55 (12.0)	0.027 *
	Maried	291 (64.0)	161 (35.4)	130 (28.6)	
Education level	Divorced	265 (58,2)	198 (43.5)	67 (14.7)	<0.001***
	Widow	134 (29,8)	57 (12.7)	77 (17.1)	
	Illiterate	55 (12,0)	15 (3.2)	40 (8.8)	
Socio-economic status	Lessthan 3000 dirhams	355 (78,0)	215 (47.2)	140 (30.8)	0.056 NS
	More than 3000 dirhams	100 (22,0)	55 (12.0)	45 (10.0)	
Health coverage	Yes	339 (74,5)	179 (39.3)	160 (35.2)	0.006**
	No	116 (25,5)	91 (20.0)	25 (5.5)	
Obesity or overweight	Yes	178 (39.0)	127 (27.8)	51 (11.2)	0.034*
	No	277 (61.0)	143 (31.4)	134 (29.6)	
Diabetes	Yes	218 (48.0)	129 (28.4)	89 (19.6)	0.512 NS
	No	237 (52.0)	141 (31.0)	96 (21.0)	
Personal history of stroke	Yes	32 (7.0)	7 (1.6)	25 (5.4)	<0.001***
	No	423 (93.0)	263 (57.8)	160 (35.2)	
History of stroke (family, close, neighbors)	Yes	66 (14.5)	22 (4.9)	44 (9.6)	<0.001***
	No	389 (85.5)	248 (54.5)	141 (31.0)	
Smoking	Yes	50 (11.0)	23 (5.0)	27 (6.0)	0,134 NS
	No	405 (89.0)	247 (54.2)	158 (34.8)	
Alcoholism	Yes	22 (4.8)	12 (2.6)	10 (2.2)	0.021*
	No	433 (95.2)	258 (56.2)	175 (39)	
%: Percentage; †: Includes single, divorced and widowed persons; p: Calculated by Chi Square Test ($\chi 2$) or Fisher's exact test; ***: p < 0,001; *: p< 0,01; * p: < 0,05; NS: p> 0,05: Non-significant.					

Discussion:-

Hypertension is an important factor in the prevalence of strokes worldwid[15].Effective awareness and in-depth knowledge of the risk factors for strokes are critical to ensuring the early prevention of these incidents[16].For example, this study was aimed at examining knowledge about stroke in hypertensive patients in the province of Essaouira in Morocco. In this survey, the majority of participants were women (66.4%), 50.5% were 60 years of age or older, and 62.2% were residents of urban areas. Most respondents were married (64%), and 58.2% were illiterate.

In this study, 84.6% of hypertensive patients became aware of the preventable nature of strokes. These results are consistent with those observed in previous research[17–19]. In addition, the majority of respondents (80.2%) said that stroke is a disability disease, which is in line with the findings of a study conducted in other contexts that highlighted that strokes are generally associated with heavy physical burden, disabilities, and addiction[20,21].

This study found that respondents were mainly aware of high blood pressure (82.6%), depression and stress (75.8%), and heart disease (71.4%) as risk factors for stroke. These results are comparable to those of a wide range of studies conducted in different countries[9,22–25]. However, there has been a significant lack of public knowledge of stroke risk factors, including those most common and well-established. For example, almost half of the participants did not recognize diabetes or hypercholesterolemia as factors for stroke. This is in line with the findings of other studies that show that 2.3 to 77% of patients with high blood pressure were not aware of any risk factors for strok[9,24].

The ability of participants to recognize signs or symptoms of a stroke remains low among respondents. Signs of stroke, sudden numbness or weakness in the face, arm, or leg, sudden confusion, difficulty in expressing yourself or understanding others, abrupt vision impairment, sharp dizziness, difficulties in walking or lack of balance, and sudden and severe headaches were reported by less than half of the participants. These results were far from those of other studies that specified that among hypertensive patients, signs of stroke, sudden paralysis/weakness of half the body, abrupt speech disorders, sudden and severe headaches, and sudden double vision were reported by more than 65% of participants[9].

Of the participants, 59.3% showed a low level of knowledge about stroke, indicating a significant gap in their understanding of the risk factors, symptoms, and preventive measures associated with stroke. This result is consistent with a previous study in Morocco, which showed that most participants had little knowledge of the risk factors and signs of stroke[2].The findings of this study also align with those of many previous international studies, which showed that basic knowledge and understanding of the risk factors and precursor signs of stroke were insufficient in people with hypertension [9,24,26,27]. On the other hand, our results differ from studies conducted in Cameroon with the general public, which revealed a good level of knowledge about strokes[17].One potential explanation for our findings is that many respondents may be poorly informed due to insufficient awareness-raising campaigns on stroke prevention and associated risk factors. As well as the high percentage of illiteracy in this region of Morocco, especially among the elderly[28]. This could create a significant knowledge gap for residents of areas where access to adequate information is limited.

This current study compared the level of knowledge of hypertensive strokes with their demographic and health characteristics to determine differences within the variables. For example, for socio-demographic variables, there is a significant difference between the low- and high-level knowledge groups by age ($p<0.01$), the middle of residence ($p <0.01$), the level of education ($p >0,001$), the marital status ($P<0.05$), and social coverage ($P <0.01$). Indeed, in this study, respondents aged 40 and over, educated, urban, married, and with social coverage showed a statistically significantly higher level of knowledge of stroke than those under 40 years of age, illiterate, rural, unmarried, and with no social coverage. These results were predictable, as knowledge about strokes tends to improve with education, access to care, and employment[2,9,24]. One possible explanation of these findings is that individuals with a higher level of education, residing in urban areas, with financial resources for care with social coverage, and with marital social support have either greater access to educational programs or easier access to the necessary resources.

Similarly, a significant difference was found between the low knowledge group and the high knowledge group based on certain health characteristics, such as the notion of obesity or overweight ($p<0.05$), personal history of stroke ($p <0,001$), and history of stroke in the immediate family, relatives, and neighbors ($p>0,001$). Indeed, in the present study, it has been demonstrated that a personal history of stroke or the patient's environment is a protective factor

against a low level of knowledge. This result is similar to that found in several surveys[29–31]. While other studies have shown the persistence of a low level of knowledge in patients surviving a stroke[32,33]. This can be explained by the individualized information and awareness sessions organized in the hospital environment by health professionals involved in the care of stroke patients, which allow for the accumulation of knowledge about the disease during the course of care. This dynamic is also likely to be linked to anxiety about the risk of a new stroke, which prompts patients to seek more information about the disease, especially for those whose unpredictable onset of the stroke causes a state of anticipatory anxiety.

Furthermore, a significant difference was between the low-knowledge group and the high-knowledge group with certain toxic habits, including alcoholism ($p = 0.05$). This result is consistent with other studies[4,9,16]. Therefore, an in-depth understanding of stroke risk factors is crucial to preventing these events early[24,26]. For example, it is imperative to establish ongoing health education for patients with hypertension so that they can adopt preventive strategies such as regularly taking antihypertensive drugs and constantly monitoring their blood pressure and sugar levels in order to limit risk factors.

Conclusion:-

This study revealed a low level of knowledge of stroke in hypertensive patients living in the province of Essaouira in Morocco. The findings indicate that policymakers should implement effective educational interventions that can contribute to primary stroke prevention programs to help the community, especially high-risk groups suffering from hypertension, better understand cardiovascular disease and stroke prevention measures. Further research on stroke prevention is needed to include other regions of the Kingdom. Furthermore, future studies should focus on the design and implementation of educational programs for hypertensive patients and the general public while evaluating their effectiveness.

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Conflicts of interest

The authors have no conflicts of interest to declare.

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