



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(3): 1745-1749
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www.thepharmajournal.com
Received: 23-01-2023
Accepted: 26-02-2023

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Premorbid food consumption pattern and associated noncommunicable diseases among the ischemic stroke patients

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Abstract

Background: There is an increase in the prevalence of stroke among the Keralites. Stroke is also considered as one of the leading causes of morbidity and mortality. Studies relating premorbid food consumption pattern and related noncommunicable diseases (NCDs) among the stroke patients were scarce.

Objectives: The objective of the study was to find out the premorbid food consumption pattern and associated noncommunicable diseases among the selected ischemic stroke patients.

Methodology: A total of 100 ischemic stroke patients were recruited for the study, food consumption patterns were collected through developed questionnaire, NCD data collected were from medical records, current nutritional status was analysed by recording Body Mass Index. The collected data were processed using frequency tabulation and percentage.

Results: Out of 100 ischemic stroke patients, 75 percent were males. Analysing the age groups, always observed that patients in the age group of 61-70 years were more affected. A combination of hypertension and diabetes (42%) was the major morbidity, followed by 21 percent having diabetes, dyslipidaemia and hypertension combination. The duration of two to three comorbidities ranged from less than 1 year, 52 percent of the ischemic stroke patients were under over weight category and 19 percent was categorized as obese. Poor dietary intake with low frequency of fruits and vegetables and high frequency of cereals, snacks items were reported by 90 percent.

Conclusion: Studied sample of ischemic stroke patients 75 percent were male and 25 percent were female and in all, 45 percent of the total stroke occurs in the age group of 61-70 years. A combination of hypertension and diabetes was identified as predisposed factor for ischemic stroke. Males in the age group of 61-70 years are seen to be more prone to ischemic stroke with comorbidities in varying duration. The study conforms with nutrition related NCDs diabetic mellitus, and dyslipidaemia, hypertension, obesity. The study also revealed that unhealthy dietary practices were more prone in the ischemic stroke patients.

Keywords: Ischemic stroke, hypertension, diabetes, obesity, food consumption pattern

Introduction

Nutrition related noncommunicable diseases (N-NCDs) are the common reason for cardiovascular diseases, diabetes, stroke and cancer (WHO, 2017) [14]. Stroke is the second cause of death worldwide (Strong *et al.*, 2007) [11] and in the Indian scenario, it is the fourth reason of death (Park, 2013) [8]. Stroke creates a long-term burden on survivors, their families, and broadly, the community also. The main nutrition related risk factors for stroke include high blood pressure, unhealthy eating pattern, high serum cholesterol level, over weight and obesity.

In the past few years, these nutrition related risk factors were more prevalent in Kerala, which increased the burden of diseases especially coronary arterial diseases and stroke (Grace *et al.*, 2016) [4]. Thus, it is important to know the pattern of nutrition-related NCDs among the selected ischemic stroke patients in Kerala.

Objective

The objective of the study was to find out the premorbid food consumption pattern and associated noncommunicable diseases among the selected ischemic stroke patients.

Materials and Methods

Sample

The study was conducted in 100 ischemic stroke patients admitted at the Comprehensive Stroke Care Program, Department of Neurology, Sree Chitra Tirunal Institute of Medical

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Sciences and Technology (SCTIMST), Thiruvananthapuram. The study protocol was approved by Institutional Ethics Committee. A written consent was obtained from the patients before participating in the study. Since the patients were not able to give written consent due to altered sensorium, the entrusted with giving the written consent.

Data Collection

A detailed food consumption pattern was obtained from the patient and bystanders using the Food frequency and Preference questionnaire. The data regarding N-NCDs among ischemic stroke patients such as hypertension, diabetes mellitus, coronary artery disease, and dyslipidemia were collected from medical records. Direct assessment of BP was done reading with mercury sphygmomanometer. The patient was considered diabetic if their previous history of diabetes or random glucose level was more than 200 mg/dl or more and the HbA1c value $\geq 6.5\%$. Total cholesterol level of more than 200 mg/dl, triglyceride more than 150 mg/dl LDL cholesterol more than 100 mg/dl and HDL cholesterol less than 40 mg/dl was considered as morbid state.

In order to calculate the BMI, height and weight of the patients were separately recorded. For weighing, the patients who were able to stand and walk, plat form weighing balance was used. Many stroke patients were unable to stand, so in this condition simple arithmetic weight measuring method is used. Average body weight (ABW) for each gender (Buckley *et al.*, 2011) [15]. Then BMI (Shetty and James, 1994) [16] has been calculated using the formula:

$$\text{BMI} = \text{Body weight (kg)} / \text{Height (m}^2\text{)}$$

Statistical Analysis

The data was compiled and entered into Microsoft Excel and the statistical analysis was performed using SPSS software. The data was analysed in terms of percentage, frequencies and graphs

Results

Based on the age and gender wise distribution, the data revealed that 75 percent of the ischemic stroke patients were males and 25 percent were females. 44 percent of the males and 48 percent of the females belong to the age group of above 60 years category. Similarly, 25 percent of the males and 24 percent of females were below ≤ 50 years of the age, which is a matter of concern (Figure 1).

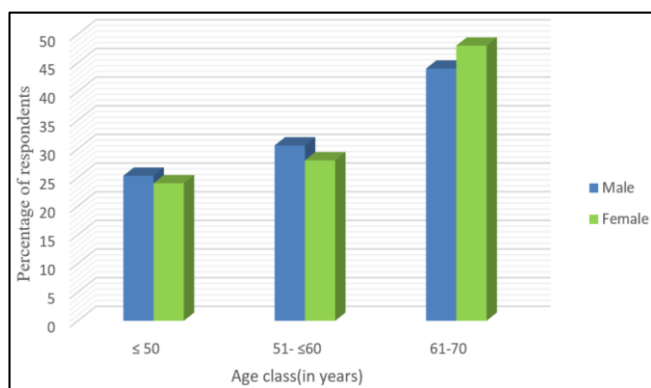


Fig 1: Age and gender-wise distribution of ischemic stroke

The prevalence of single morbidities and combined comorbidities was reported among the ischemic stroke

patients Viz., hypertension (HT), diabetes mellitus (DM), coronary artery diseases (CAD), and dyslipidaemia (DLD).

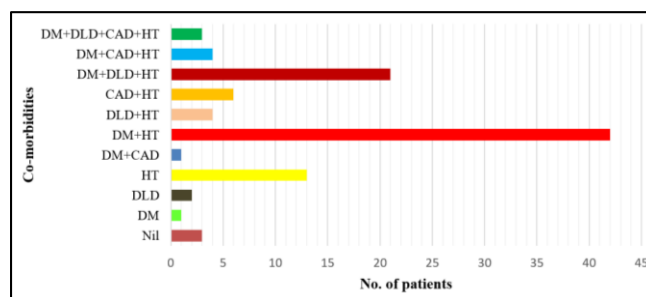


Fig 2: Affected co-morbidities of selected ischemic stroke patients

The figure 2. portrays that 42 percent of the selected ischemic stroke patients had diabetic mellitus and hypertension (DM and HT) and is more prevalent comorbidities in combination, 21 percent have diabetic mellitus, dyslipidaemia and hypertension (DM, DLD and HT) and 13 percent had hypertension (HT) only.

Table 1: Number of duration of comorbidities (N=100)

Co morbidities	Affected years			total
	≤1 (Year)	1 to 15.50 (Years)	≥15.51 (Years)	
One	13(48.1)	6(9.4)	0	19(1)
Two	11(40.7)	25(39.1)	5(55.6)	41(41)
Three	3(11.1)	30(46.9)	2(22.2)	35(35)
Four	0	3(4.7)	2(22.2)	5(5)
Total	27(100)	64(100)	9(100)	100(100)

Correlation significant at 0.00 percent level

Table 1 depicts the duration of comorbidities of the patients. The duration was classified to ≤ 1 years, 1 to 15.50 years and ≥ 15.50 years.

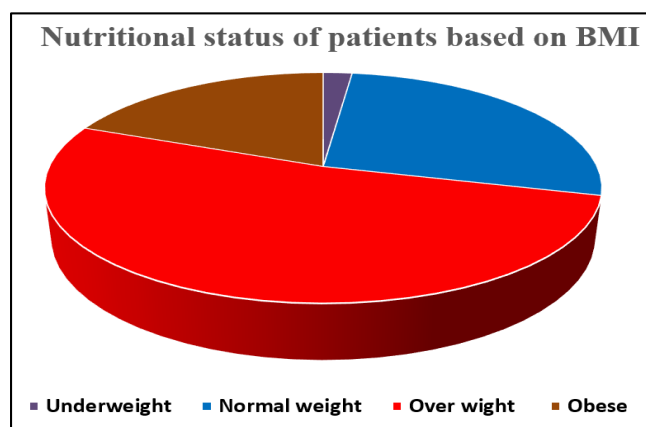


Fig 3: Distribution of selected ischemic stroke patients according to their BMI

Overall 52 percent of the ischemic stroke patients were under over weight category. In total only 27 percent of the population were under normal nutritional status. Only two out of 100 were categorized as underweight. One of the alarming notes is that 19 percent were obese. This study reveals above 50% of the patients were overweight.

Food consumption frequency of selected ischemic stroke patients

The frequency of use of different food items were quantified using food frequency and preference scale.

Table 2: Frequency of consumption of different food groups

Food groups	Frequency			
	Daily (90-100%)	Frequently used (75-89%)	Less frequently used (15-74%)	Least frequently used (<15%)
Cereals	Rice, wheat	Maida	Atta, broken wheat, ragi, oats	Rice flakes, semiya, barley
Pulses	Black gram		Bengal gram, lentils,	Split Bengal gram, horse gram, kidney beans, black eyed beans, green peas
GLV	Nil	Curry leaf's	Cauliflower	Red amaranths, green amaranths, drum stick leaf's, celery, agasthi leaf
Roots and tubers	Nil	Carrots, onion	Cabbage, beetroot, shallots, potato, tapioca, yam	Arrow root, Colocasia, radish, sweet potato,
Other vegetables	Nil	Cucumber, ladies' finger, brinjal	Drumstick, tender jack fruits, pumpkin, plantain, long beans, snake gourd	bitter gourd, onion stem, papaya green
Nuts and oil seeds	Coconut		Peanut, almond	Walnut, pistachio, hazelnut
Spices and condiments	chilli powder, coriander powder, tamarind, turmeric	Pepper,	Asafoetida, nutmeg, clove	sesame
Fruits	Nil	Apple, banana, dates, grapes, tomato	Amla, lemon, orange, pomegranate, water melon,	Jackfruit, rose apple, sweet lemon, papaya, pineapple, plum, chikku
Fish	Sadarine, makeral,	pomfert, prawn		Pearl spot
Meat & egg	Egg (hen)	Beef, chicken	Mutton	Duck, pork, liver
Milk & milk products	Milk (cow)		Curd	Buffalo milk, goat milk
Fats & oils	Coconut oil,	Butter, ghee,	Sunflower oil, palm oil	Rice bran oil
Sweetening agents	Nil	Sugar		Molasses, honey
Snacks	biscuit, cake, vada, Banana chips,	burger, mixture, puffs		
Dessert	Nil	Payasam	ice cream, custard,	Pudding, pastries
Beverages	Tea	Complan, coffee,	Juices, boost	Cola, spite, tender coconut water
Food preparations	Dosa, idli, chapati with oil, parotta, uppuma, fried rice,	puttu, corn flour, pulav, halwa, pakkoda, murukku,	Noodles, unniappam, neyyapam, peda, bonda, ground nut candy,	

The table 2 displays the frequency of premorbid consumption of food by the selected ischemic patients under different food groups.

Cereals are the mostly staple food and the study shows that the consumption of cereals daily includes rice and wheat. Consumption of pulses (black gram) was observed on daily basis. It was also observed that fish (Sadarine, maceral), meat, egg(hen), milk (cow), coconut oil, fried snacks, beverages like tea were consumed daily by the selected ischemic stroke patients. It was also observed that items like parotta made of White flour (maida), chapati with oil were also consumed on daily basis by the ischemic stroke patients. It was also observed that the patients consumed coconut oil daily.

The table also revels lower intake of green leafy vegetable which was almost nil on daily basis. However green leafy vegetables like curry leaves were used frequently. The frequency of consumption of red amaranths, drumstick leaves and other leafy vegetables were observed to be least.

The consumption of roots and tubers was also seen to be nil on daily basis. Tubers like carrots and onions were used frequently. The frequency of consumption of colocasia, shallots and potatoes were less. Frequency of consumption of arrowroot radish and sweet potato was the least.

The study also reveals that the consumption of other vegetables on daily basis was nil. Vegetables like cucumber, ladies finger and brinjal was consumed frequently. The frequency of consumption of drumsticks, pumpkin, plantain,

long beans and snack gourd was less. Vegetables likes bitter gourd; onion stem and papaya green were consumed in least manner.

The consumption of nuts and oil seeds was observed and it was reported that coconut intake was on a daily basis. However peanut and almond was consumed less. The consumption frequency of walnut, pistachio and hazelnut was least frequent. The spices and condiments like chilli powder, coriander powder, tamarind and turmeric are consumed daily. Pepper was consumed frequently. Asafoetida, nutmeg and clove were reported to be less frequently consumed and sesame as the least.

The table No 2 revels that fruits were not consumed on regular basis or daily. However, apple, banana, dates, grapes and tomato were reported to have been consumed frequently. Amla, lemon, orange, pomegranate and water melon were less frequently and Jackfruit, rose apple, sweet lemon, papaya, pineapple, plum, chikku were consumed the least.

Egg consumption pattern was reported as maximum on daily basis. Beef and chicken consumption were frequent. Mutton was less frequent and duck, pork and liver was least frequent. Milk consumption pattern was also reported as most frequent on daily basis. However, the consumption of curd was frequent and the consumption of buffalo milk and goat milk was least.

The study also reveals that the majority of the selected ischemic stroke patients consumed coconut oil most

frequently that on daily basis. Butter and ghee consumption was observed to be frequent. The frequency of consumption of sunflower oil and palm oil was less frequent where as the consumption of rice bran oil was least. It was also reported that the consumption of sweetening agents on daily basis was nil. However, the sugar intake was reported as frequent, molasses and honey were least.

The majority of the ischemic stroke patients had the habit of taking snacks like biscuits, cakes, vada and banana chips on daily basis. The consumption of burger, mixture, puffs was reported frequent. The consumption of desserts was reported to be least on daily basis.

Discussion

Worldwide, stroke is a leading cause of adult disability, and the related mortality is sensitive more among men (CDC, 2020)^[2]. The present study also reveals that 75 percent of the selected ischemic stroke patients were males and 25 percent were females. Similar findings were observed in different hospital-based studies in India as well as Kerala by Subha (2015)^[12], Somasundram and Potty (2020)^[9], Ojha *et al.* (2020)^[7].

The majority of the selected ischemic stroke patients were elderly persons and they were in the age group of 61- 70 years. Similar profile was observed by Somasundaran and Potty (2020)^[9] in Thrissur, Kerala. In a study conducted by Sridharan *et al.* (2009)^[10], the mean age of stroke occurrence reported in the Kerala population was 67 years. Thirty percent of the patients were in the age group of 51- ≤60 years. It was also noticed that 25 percent of the patients belonged to the age group, less than 50 years, pointing towards the increasing incidence of stroke among youngsters which is substantiated by the data from Trivandrum Stroke Registry (Sridharan *et al.*, 2009)^[10].

In the present study, combination of hypertension and diabetes (42%) was seen as the major risk factors, followed by 21 percent having diabetes, dyslipidaemia and hypertension together. Systemic hypertension alone or in combination with other risk factors significantly contributes to stroke incidence (Dash *et al.*, 2014)^[3]. Similar findings were observed in the study by Subha *et al.* (2015)^[12] viz., hyperlipidemia, cardiac diseases and hypertension are the common risk factors for stroke. These patients reported comorbidities from over 15 years. This study reveals above half of the patients (52%) in the overweight category a similar trends were observed in different studies in Kerala (NFHS, 2019, Bindhu *et al.*, 2019)^[5, 1].

The data indicates that a suboptimal nutritional status, including an excess caloric intake (Particularly junk foods and bakery items), reduced protein intake, and micronutrient deficiencies (particularly due to not consuming fruits, vegetables, green leafy vegetables on daily basis or frequently). This type of food consumption pattern elevates the incidence of non-communicable diseases.

Public awareness, early detection and treatment of nutrition-related NCD especially dietary modification and lifestyle modification are essential to reduce the incidence of stroke in Kerala (Sylaja *et al.*, 2021)^[13]

Conclusion

In studied sample of ischemic stroke patients 75 percent were male and 25 percent has female and in all, 45 percent of the total stroke occurs in 61-70 years. A combination of

hypertension and diabetes is identified as predisposed factor for ischemic stroke. Males of the age groups are seen to be more prone to ischemic stroke. The study conform with nutrition related NCDs diabetic mellitus, and dyslipidaemia, hypertension, obesity and unhealthy dietary practices were more prone in the ischemic stroke patients. Careful evaluation of dietary intake, especially among those with eating disabilities and preexisting malnutrition, may aid in the identification of individuals at increased nutritional risk through which early intervention may benefit recovery and rehabilitation and prevent further complications after stroke. High rates of premorbid undernutrition in stroke patients were found. The results of this provide opportunities for primary prevention of stroke by consuming healthy and nutritious food. Stroke prevention strategies should target undernutrition in the population at risk for stroke to improve outcomes.

Limitations

The patients who participated in the study were a single hospital and it is a tertiary care hospital. People come for complex treatment.

Conflicts of Interest

The authors declare no conflicts of interest with regard to the publication of this paper

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