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Impact of Nutritional Intervention for Patient with Cerebrovascular Accident and Atrial Fibrillation Secondary to Hypertensive Emergency

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ABSTRACT

This case study aims to report on the nutrition management of Cerebrovascular Accidents (CVA) which have a higher risk of malnutrition due to dysphagia, hemiparesis, decreased mobility, and dementia. Mrs. L, a 76-year-old Chinese lady, was less responsive at home. Upon admission, she was diagnosed with hypertensive emergency complicated by CVA, newly diagnosed atrial fibrillation, and End-Stage Renal Disease (ESRD). Her Body Mass Index (BMI) is 22.5 kg/m^2, which is underweight for her age. The patient, with abnormal blood results, high blood pressure, and poor Glasgow Coma Scale (GCS) score, was treated with nasogastric enteral feeding and a disease-specific formula for diabetes. Inadequate enteral nutrition infusion related to feeding has yet to optimize as evidenced by intake of 57% of energy and 0.6 g/kg body weight of protein. Mrs. L required 1,442 kcal of energy and 57.7 g of protein (1 g/kg body weight) to meet adequate bodily function and prevent further weight loss. The nasogastric enteral feeding was optimized to 250 mL, seven times daily using the same diabetic formula. Throughout follow ups, although the patient's dietary intake improved, she experienced episodes of diarrhea. She was also put on a 500 mL fluid restriction per day. Considering those issues, the disease-specific formula was changed to renal disease formula. The patient then progressed to a soft diet with improved GCS scores and other conditions. This case highlights dysphagia which is the leading cause of malnutrition in stroke patients, associated with poor prognosis, increased mortality, and deteriorated health outcomes, necessitating enteral nutrition support to enhance nutritional status and promote health. It can be concluded that MNT in managing patients with CVA, hypertensive emergency, and underlying diseases of diabetes and ESRD helps to improve the patient's recovery. The patient's treatment and diet should be optimally adjusted through close monitoring and evaluation.

Keywords: cardiovascular disease, diarrhea, dysphagia, malnutrition

INTRODUCTION

Stroke, also known as Cerebrovascular Accident (CVA), is the second most common cause of global death and contributor to worldwide morbidity and mortality. Notably, in Malaysia, it is the third leading cause of death. There were 47, 911 incident cases, 19,928 deaths, 443,995 prevalent cases, and 512,726 Disability-Adjusted Life Years (DALYs) lost due to stroke in 2019 (Feigin *et al.* 2021). Hypertension is a well-established and overall risk factor for stroke and other cardiovascular diseases. Recently, hypertension was defined as the blood vessels' pressure exceeding 130/80 mmHg (American Heart Association (AHA) 2023). Meanwhile, the hypertensive emergency is characterized by a severe blood pressure increase which is generally more than 180/120 mmHg and is associated with acute organ damage, including acute cerebrovascular events, myocardial infarction, unstable angina, hypertensive encephalopathy, aortic dissection, acute congestive heart failure with pulmonary edema, hemolysis, increase in liver enzymes and low platelet count (HELLP syndrome), eclampsia, acute renal failure, as

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well as microangiopathic hemolytic anemia (Cantone *et al.* 2021). Institute for Public Health (IPH 2020) revealed that based on report of National Health and Morbidity Survey (NHMS) 2019, 6.4 million adult Malaysians suffered from hypertension, resulting in the highest prevalence of hypertension in Asia. To make it worse, about half of them were unaware that they had that condition.

Other than hypertension, uncontrolled diabetes mellitus also puts persons at risk of stroke. Diabetes may cause pathologic changes in blood vessels at various locations. If cerebral vessels are directly affected, it can lead to stroke. Also, stroke patients with uncontrolled blood sugar levels had poorer post-stroke outcomes and higher mortality (Chen *et al.* 2016). The aim of administering the medical nutrition therapy to this patient was to prevent stroke-associated malnutrition, as nearly 90% of stroke patients had a risk of malnutrition resulting from dysphagia, hemiparesis, decreased motility, and dementia.

PATHOPHYSIOLOGY

Stroke is a neurological disorder that is caused by blockage of blood vessels called arteries. The blood flow to the brain is interrupted by a blood clot, causing the arteries to rupture, leading to bleeding. These ruptured arteries during stroke result in the brain cells' sudden death due to a lack of oxygen (Kuriakose & Xiao 2020). The blood flow to the brain is managed by the circle of Willis, which consists of two internal carotids anteriorly and two vertebral arteries posteriorly. There are two types of strokes which are ischemic stroke and hemorrhagic stroke. Ischemic stroke is caused by an inadequate supply of blood and oxygen to the brain. On the other hand, hemorrhagic stroke is caused by uncontrollable blood vessel bleeding inside the brain.

Ischemic occlusion generates brain thrombosis and embolism (Musuka *et al.* 2015). In thrombosis, there is an obstructive process that prevents blood flow to some regions of the brain. Vasculitis, arterial dissection, and atherosclerotic disease are the risk factors. When a clot originates from another part of the body, embolic events happen. The heart's valve or chambers are most frequently the source of clots; an example of this would be when a clot forms in the atria during atrial fibrillation and becomes dislodged into the arterial blood supply. Less common causes are emboli from fat, venous, septic, or air. Small vessel disease is the cause of lacunar infarcts, which are typically observed in the brain's subcortical regions. The blood vessel occlusion in the subcortical region is thought to be caused by a perforating artery (Hui *et al.* 2022).

In hemorrhagic stroke, a blood vessel rupture, and stress on the brain's tissue causes bleeding into the brain. The two types of hemorrhagic stroke that can be distinguished further are Subarachnoid Haemorrhage (SAH) and Intracerebral Haemorrhage (ICH). SAH is leaking into the subarachnoid space, and ICH is leaking into the brain parenchyma (Unnithan *et al.* 2023). Robertson (2023) stated that many who survive stroke recover their independence, although some have minor disabilities. Stroke may lead to eating and drinking abilities due to disorders of consciousness, postural instability, decreased mobilization, limitations in communication, and fatigue (Arsava *et al.* 2018).

Some medical conditions such as atrial fibrillation, type 2 diabetes mellitus, hypertension as well as Chronic Kidney Disease (CKD) stage 5 are the risk factors for stroke (Centers for Disease Control and Prevention 2023). Atrial fibrillation is an abnormal cardiac rhythm that occurs when electrical impulses come from places other than the Sinoatrial (SA) node, in the heart, referred to as ectopic foci (MacDonalds 2021). The atria quiver instead of contracting and relaxing in a regular synchronised manner as a result of the ectopic impulses. A patient's chance of having a stroke or pulmonary embolism is greatly increased by this quivering motion, which permits blood to pool in the atria (Lewis *et al.* 2014). A typical rhythm of 60 to 100 ventricular beats per minute is produced by the additional electrical impulses being carried from the atria to the Atrioventricular (AV) node, where they may be delayed (McCance *et al.* 2019).

Next risk factor for stroke is diabetes mellitus. The association between diabetes mellitus and stroke is linked to the way the body uses blood glucose to produce energy (American Stroke Association (ASA) 2020). To provide body with energy, the majority of the food digested is converted to glucose. After food is digested, glucose enters the bloodstream and moves to all of the body's cells. Insulin is a hormone that is necessary for glucose to enter cells and supply energy. The appropriate amounts of this insulin are produced by the pancreas. Insulin is not produced by the pancreas in those with type 1 diabetes mellitus. People with type 2 diabetes mellitus have insufficient insulin production from the pancreas, or improper insulin use by the muscles, liver, and fat. Consequently, individuals with untreated diabetes have excessive blood glucose levels and insufficient cellular energy. Overdosing on blood glucose for a period of time will cause blood vessel to get damaged. This is because more sugar binds to red blood cells and accumulates in blood as the body is unable to utilise the sugar. The blood vessels may become blocked or damaged as a result of this accumulation, depriving the brain of oxygen and nutrients.

The pathophysiology of hypertension includes impairment of renal pressure natriuresis, the feedback mechanism wherein elevated blood pressure causes the kidneys to excrete more water and salt, which lowers blood pressure. A number of factors can lead to pressure natriuresis, including compromised kidney function, improper activation of hormones (such those in the renin-angiotensin-aldosterone system) that control the kidney's excretion of salt and water, and excessive sympathetic nervous system activation (Hall *et al.* 2017). All over the body, arteries are harmed by high blood pressure, which makes it easier for them to burst or clog. The chance of having a stroke is significantly increased if there are weakened or obstructed brain arteries (American Heart Association (AHA) 2022).

Chronic Kidney Disease (CKD) stage 5 is characterized by estimated Glomerular Filtration Rate (eGFR) less than 15 for 3 months or more (National Kidney Foundation (NKF) 2023). When a disease or condition impairs kidney function, the kidney damage worsen and finally reaches an advanced state in which the kidneys can no longer function as body requires them to. As reported by Kelly *et al.* (2021), the pathophysiology pathways to stroke in CKD can be caused by traditional and non-traditional mechanisms. The traditional mechanisms include atrial fibrillation, hypertension, diabetes mellitus, and all of which are frequently comorbid with CKD. On the other hand, it is hypothesised that non-traditional CKD-related mechanisms like anaemia, uremic toxins, reactive oxygen radicals, chronic inflammation, and mineral-bone disorders increase the risk by inducing endothelial dysfunction and vascular injury. For instance, increased dyslipidemia due to uremia can result in protein carbamylation, which has proatherosclerotic effects. Additionally, it may worsen platelet adhesion and platelet-endothelial contact, raising the possibility of hemorrhagic stroke.

PATIENT PROFILE

A 76-year-old Chinese lady was brought to the emergency department after being found less responsive at home by her family member. It was a sudden onset incidence. Before that, she was Activities of Daily Living (ADL)-independent. She is married and blessed with two children staying with her. She has known cases of type 2 diabetes mellitus and hypertension for more than 20 years, and recently she was diagnosed with Chronic Kidney Disease (CKD) stage 5. Still, she refused to go for renal replacement therapy. She also had a history of breast cancer stage 3. A right mastectomy was performed four years ago, with no following chemotherapy reported. The diagnostic tests and procedures confirmed the diagnosis of hypertensive emergency complicated with Cerebrovascular Accident, newly diagnosed Atrial Fibrillation, post-infarct seizure secondary to hypertensive emergency, and Acute Kidney Injury (AKI) in CKD.

NUTRITION ASSESSMENT

Anthropometry data

On admission, the patient's estimated body weight was 54.1 kg, estimated height was 155 cm. She was classified as underweight for her age (Winter *et al.* 2014), with a BMI of 22.5 kg/m^2.

Biochemical data (Table 1), medical tests, and procedures

The initially high random blood sugar level improved to a normal level after insulin injection was introduced to the patient. The patient had exceeded the urea, creatinine, and potassium levels, probably due to chronic kidney disease, and was deficient in blood hemoglobin, hematocrit, total protein, and albumin levels, which can be caused by renal insufficiency.

Nutrition focuses physical findings

The patient's blood pressure was consistently high, with the latest 159/75 mmHg

Table 1. Mrs. L's interventional result based on nutrition assessment domain

	Domain	Normal	Initial	Follow up 1	Follow up 2	Interpretation
A[a]	Body mass index (kg/m^2)	24–30[e]	22.5	22.5	22.5	Underweight for age, no weight change
B[b]	Urea (mmol/L)	2.8–7.2	24.3	-	-	Above normal range
	Sodium (mmol/L)	136–146	136	-	-	Within normal range
	Potassium (mmol/L)	3.4–4.5	4.8	-	-	Above normal range
	Creatinine (mmol/L)	45–84	608	-	-	Above normal range
	White blood cell (10^9/L)	4–10	6.5	-	-	Within normal range
	Hemoglobin (g/L)	12–15	8.8	-	-	Below normal range
	Hematocrit (µmol/L)	36–46	25.9	-	-	Below normal range
	Total protein (g/L)	66–83	49.5	-	-	Below normal range
	Albumin (g/L)	35–52	28.5	-	-	Below normal range
	Total bilirubin (µmol/L)	5–21	5.6	-	-	Within normal range
	Random blood sugar (mmol/L)	4–10	10.1–10.3	9.7–11	6–11	Uncontrolled, improving
NFPF[c]	Blood pressure (mmHg)	120/80	159/75	138/69	130/63	Uncontrolled, improving
	Heart rate (bpm)	60–100	76	70	70	Normal
	Respiratory rate (brpm)	16–20	20	20	20	Normal
	Temperature (°C)	37	37	37	37	Afebrile
	SPO2 (%)	95–100	95	97	97	Normal
	Ventilator	-	Venti-mask	Venti-mask	Venti-mask	-
	Bowel open, amount (Bristol stool chart)	-	One time, moderate (Type 7)	One time, moderate (Type 7)	One time Small (Type 5)	Resolved diarrhea
	Input/Output	-	2,190/790 (+1,490)	2,180/1,100 (+1,080)	860/1,850 (-990)	Low urine output, improving
	Glasgow coma scale	15/15	5T/15	9/15	15/15	Fully conscious
FNRH[d]	Energy (kcal)	1,442[f]	828	1,277	731	Inadequate intake, worsening
	Protein (g)	57.7[g]	36.8	56	32.3	Inadequate intake, worsening
	Fluid (mL)	2,254[h] & 500[i]	1,430	2,030	587	Adequate intake

[a]Anthropometry data; [b]Biochemical data; [c]Nutrition-Focused Physical Finding; [d]Food/Nutrition-Related History, based on 24-hour dietary recall; [e]Normal range for BMI for elderly (Winter *et al.* 2014); [f]Recommended daily energy intake, calculated by the formula (ideal body weight x 20 kcal) (Volkert *et al.* 2019); [g]Recommended daily protein intake, calculated by the formula (ideal body weight x 1.0 g) (Fiaccadori *et al.* 2021); [h]Recommended daily fluid intake, calculated by the formula ([ideal body weight – 20] x 20 mL + 1,500 mL) (Holliday & Segar 1957); [i]Restriction of fluid prescribed by the doctor

reading. The patient's heart rate, respiratory rate, and SpO2 level were all normal; the latest reading of 76 beats per minute (bpm), 20 breaths per minute (brpm), and 95% oxygen with the support of Ventimask 40%, respectively. The patient was also afebrile. She was intubated but not sedated. Her consciousness level based on the Glasgow Coma Scale (GCS) was E4VtM1. The previous day's input was 2,190 mL, and output was 790 mL, giving the balance of +1,490 mL with a one-time moderate amount of loose stool (Type 7 according to Bristol Stool chart).

Food nutrition-related history

A nasogastric tube was inserted since the patient has a poor gag reflex. Enteral feeding was initiated, and the patient tolerated well with 250 mL of disease-specific formula for diabetes upon the dietitian's review. Her previous intake contributed to 57% of energy (828 kcal/day) and 0.6 g protein per g body weight (36.8 g/day). Together with nutritional intervention, the patient was also prescribed anti-thrombotic agents (T. Cardiprin 100 g OD and T. Atorvastatin 40 mg ON), anti-hypertensive drugs (T. Bisoprolol 2.5 mg OD and T. Amlodipine 5 mg OD), insulin injections (S/C Actrapid 6 unit TDS and S/C Insulatard 8 unit ON), antibiotic drug (IV Augmentin 1.2 g OD), anti-epileptic drug (T. Phenytoin 100 mg TDS) and antacid drug (T. Pantoprazole 40 mg OD).

NUTRITION DIAGNOSIS

Inadequate enteral nutrition infusion (NI-2.3) related to feeding has yet to be optimized as evidenced by the current energy intake of 57% and 0.6 g/kg body weight of protein from the requirement.

NUTRITION INTERVENTION

The aim of administering the nutrition therapy to this patient was to achieve adequate enteral nutrition infusion to prevent stroke-associated malnutrition. In a view to attain the mentioned objective, the following intervention was planned and executed: 1) Using the ideal body weight at BMI 24 (kg/m^2) (57.7 kg), 25 kcal energy per kg ideal body weight per day (Volkert *et al.* 2019) and 1.0 g protein per kg ideal body weight per day (Fiaccadori *et al.* 2021) was prescribed. These resulted in 1,442 kcal energy per day and 57.7 g of protein per day. The fluid recommendation was determined to ensure good hydration as suggested by Holliday and Segar (1957). The patient was given four scoops of disease-specific formula for diabetes every 3 hours, seven times per day. Each feeding yielded 250 mL of water, and a total of 1,750 mL was given to the patient; 2) The patient had received 89% of energy (22 kcal per kg body weight) and 1.0 g protein per kg body weight (56 g protein per day); 3) Pre- and post-feeding flushing of 30 mL water was done to fulfill the fluid requirement.

NUTRITION MONITORING & EVALUATION

This patient's progress was monitored several times throughout her hospitalization period. All monitoring components were reassessed, including client history, anthropometry, biochemical, nutrition-focused physical findings, and food/nutrition-related history.

The first monitoring was carried out two days following the first intervention (Table 2). There was an update on the patient's medical condition in which she was put on 500 mL fluid restriction daily because of the low urine output. There was also no new biochemical data available. The vital signs were all normal except for persistently high blood pressure. The patient was extubated, and consciousness level improved to 9/15. The patient's dietary intake had improved in which current energy intake was 89% of the energy requirement (1,277 kcal/day) and current protein intake was 97% of protein requirement (56 g/day), with no episode of aspiration. However, the patient reported diarrhea three times a day before (Type 7, according to the Bristol Stool chart). The previous nutrition diagnosis of inadequate enteral infusion has resolved. Two new nutrition diagnoses have been identified and established, which were 1) Enteral nutrition composition inconsistent with needs (NI-2.5) related to physiological causes requiring restriction of fluid of 500 mL per day as evidenced by nutrition administration that may conflict with therapies (2,030 mL per day that exceeded 500 ml per day) and 2) Altered gastrointestinal (GI) function (NC-1.4) related to a possible side effect of medications as evidenced

Table 2. Summary of diet interventions for Mrs. L

	First visit (11 April 2023)	Second visit (13 April 2023)	Third visit (14 April 2023)
Nutrition diagnosis	Inadequate enteral nutrition infusion (NI-2.3) related to feeding has yet to be optimized, as evidenced by an energy intake of 828 kcal compared to requirements of 1,441.5 kcal.	1) Enteral nutrition composition inconsistent with needs (NI-2.5) related to physiological causes requiring ROF 500 mL per day as evidenced by nutrition administration that may conflict with therapies (2,030 mL per day that exceeded 50 mL per day) 2) Altered gastrointestinal (GI) function (NC-1.4) related to possible side effects of medications as evidenced by report of diarrhea three times with large watery stool (Type 7 according to Bristol Stool chart).	Predicted inadequate energy intake (NI-1.4) related to transition feeding from enteral to oral feeding as evidenced by dietary assessment (only able to finish half of the soft diet served).
Objective	To achieve adequate enteral nutrition infusion.	1) To improve diarrhea status 2) To achieve adequate enteral nutrition infusion	To ensure adequate oral intake.
Intervention	Four scoops Diabetic formula+water→250 mL, three hourly, seven times per day.	90 mL renal formula, three hourly, seven times per day.	1) Encourage oral intake 2) Educate on diabetic diet and renal diet

by the report of diarrhea three times with large amount watery stool (Type 7 according to Bristol Stool chart). The intervention was then focused on improving diarrhea status and providing adequate intake. Thus, the diabetic formula was changed to concentrated renal formula with a new feeding regime of 90 mL, 3 hourly, seven times per day, with minimal pre-and post-feeding flushing of only 10 mL each time. However, later this feeding regime was resumed at a reduced rate for 3 times, by the nurse in charge in her view that the patient was still having diarrhea.

The patient was fully conscious the following day, with a GCS score of 15/15. The patient claimed to have a good appetite. There were also no more episodes of diarrhea. The tube feeding was off, and the patient was allowed a soft diet. During the dietitian's review, she was tolerating half of her first fish porridge served. Thus, the previous nutrition diagnoses of enteral nutrition composition inconsistent with needs and altered GI function were discontinued. However, a new nutrition diagnosis had been identified, which was predicted inadequate energy intake (NI-1.4) related to transition feeding from enteral to oral feeding as evidenced by dietary assessment (only able to finish half of the soft diet served). Hence, the objective was to re-focus on ensuring the adequacy of her oral intake. The dietary intake encouragement was emphasized with the allowance of modified home-cooked food (low sugar and sodium). The patient was then allowed to be discharged two days after that. A discharge plan has been planned for this patient as follows: 1) to increase daily dietary intake up to approximately 1,442 kcal; 2) to increase daily protein, carbohydrate, and fat intake up to 57.7 g (4 ½ exchanges), 180 g (12 exchanges), and 54.5 g (6 exchanges), respectively; 3) to restrict dietary sodium intake below 1,500 mg per day (Bossola *et al.* 2020); 4) to limit potassium intake to 2,000 mg per day (Picard *et al.* 2020); 5) increase fiber intake to 20–30 g day (MoH 2020) for better glucose monitoring; 6) to maintain a restricted fluid allowance of 500 mL per day; 7) to ensure balanced, soft diet consumption according to DASH (Dietary Approach to Stop Hypertension), diabetic and renal dietary guidelines. The reassessment findings were compared and summarized in Table 1.

DISCUSSION

Malnutrition remains a common complication of stroke and it affects prognosis and recovery (Yoon *et al.* 2023). Meanwhile, nutrition continues to be a key part of wellness and vitality among stroke patients. Due to that, the main aim of this study was to prevent stroke-associated malnutrition by providing adequate dietary intake. As guided by ESPEN (2019), the energy provision should achieve 70% from the requirement and this patient had successfully achieved near 90% of the requirement. Apart from that, another aim was to prevent stroke recurrence by managing the comorbidities, as for this study, hypertension, diabetes mellitus, and chronic kidney disease stage 5. It is well-known that all of these diseases prone to cause recurrent of stroke. Since this patient was put on mechanical ventilation, it was remarkably significant to avoid its prolonged usage. Several studies have reported that Prolonged Mechanical Ventilation (PMV) has been linked to poor post-discharge clinical outcomes. A higher post-discharge mortality rate has reportedly been linked to a PMV of ≥21 days (Hill *et al.* 2017). Patients with PMV have a 50% weaning rate and a 20% chance of being discharged to their homes, even if they survive in the intensive care unit (Damuth *et al.* 2015). For this patient, she had a notable shorten duration on mechanical ventilation which was only 11 days, and had safely returned home.

Other than adequate energy provision mentioned earlier, protein was given moderately at 1.0 g per kg ideal body weight throughout the patient's stay, per the recommendation for patients with chronic kidney disease stage 5 without kidney replacement therapy (Fiaccadori *et al.* 2021). As documented in Table 1, patient's renal profile showed that the protein waste products (urea and creatinine) were high due to the kidneys were no longer able to efficiently remove them. The more amount of protein ingested, the more will be the waste needed to be removed. Perhaps, excess waste can build up in blood causing loss of appetite, fatigue and nausea which can affect the dietary intake later on (NKF 2023). Thus, without renal replacement therapy for chronic kidney disease stage 5, moderate protein was prescribed. Carbohydrate minimum prescription of 130 g/day or 45–60% of total energy recommended is suggested to prevent ketosis, ensuring adequate intake of fiber, vitamins, and minerals, as well as providing dietary palatability in patients with type 2 diabetes mellitus (Oh *et al.* 2023). The actual carbohydrate given to this patient was 60% of the energy requirement, primarily complex carbohydrates. Whole wheat, vegetables and fruits, and legumes are the recommended types of carbohydrates, which are high in fiber and low in glycemic load. According to Marathe *et al.* (2017), glycemic control will be good, and insulin sensitivity will increase with low food glycemic index. Fat was prescribed at 34% of the energy requirement as a part of the treatment of cardiovascular disease, in line with the fat recommendation of 25–35% of energy requirement, emphasizing good fats and reduced intake of bad fats (MoH 2020).

The preferred enteral formula for this patient was a specialized formula for diabetes, as her blood sugar was uncontrolled. It significantly can lower postprandial rise in plasma glucose concentrations (Buranapin *et al.* 2014). However, later when she was on restriction of fluid as the result of low urine output, as well as had several episodes of diarrhea, the most suitable enteral formula available for her was renal formula. It was proven to be a nutritionally complete and calorically dense formula to meet the patient's needs with kidney problems and fluid restrictions due to CKD. Furthermore, as stated by Grant (2020), cellulose gel and gum content may help in case of diarrhea due to water-absorbing ability. It was also supported by Narasimhan *et al.* (2020) in a retrospective analysis regarding the use of concentrated enteral formulas in adult in which that formulas have been shown to be well-tolerated and reduce GI symptoms due to additional soluble fiber and polysaccharides as thickeners. Not only that, but the fiber content was also beneficial in blood sugar control.

Swallowing difficulty faced by Mrs. L was in check with an issue highlighted in a study conducted by Ojo and Brooke (2016) reporting that clinical manifestations of swallowing difficulties were evident in stroke patients. Insufficient food intake caused by dysphagia was the main cause of malnutrition among them, which was associated with poor prognosis, increased mortality, and deteriorated outcomes (Gong *et al.* 2021). Although this patient was allowed a soft diet, with the swallowing difficulty that she encountered, the diet intake might not be sufficient. Thus, enteral nutrition support is helpful for patients with dysphagia following a stroke to enhance nutritional status and promote health (Buoite & Manganotti 2022).

Dietary modification plays an essential role in blood pressure control more efficiently. The DASH (Dietary Approaches to Stop Hypertension) diet is considered a lifelong health approach designed to help treat or prevent high blood pressure. The DASH diet also is an essential strategy for reducing blood pressure in patients with diabetes mellitus type 2. Diabetic patients should follow the US Department of Agriculture's Dietary Reference Intake (DRI) for fiber, whole grains, and macronutrients, according to the American Diabetic Association. Moreover, patients should limit saturated fat to <7% of total daily calories, reduce trans-fat intake, reduce cholesterol to <200 mg/day, and limit sugar-sweetened beverages. Because the DASH diet complies with these guidelines, hence it should be encouraged among people with diabetes mellitus, like Mrs. L, for proper blood pressure control (Locke *et al.* 2018).

During the intervention series, there were presence of constraints, for instance, the inability to perform diet recall to assess usual intake at home as the patient had trouble remembering. The family members can only be reached through phone call but there was not much dietary information contributed as they are all working during daytime. Secondly, the biochemical data could not be monitored as she was no longer for the blood-taking procedure. Thus, any improvement in blood results could not be observed. However, other improvements are seen in her vital signs, overall physical findings, and the progress of dietary intake.

However, this study has its own strengths. The result of this study shows how important the adequacy of nutrition provision is towards stroke patients. It provides a positive prognosis for them. In addition, early enteral nutrition shall be preferably given during the acute phase of stroke if a sufficient oral food intake in not possible. Thus, this study can be referred in managing the similar cases in future.

CONCLUSION

The study results showed that the medical nutrition therapy had a favourable outcome towards stroke patient. However, the presence and involvement of family members, if available, is an added benefit as more input can be obtained especially patient's home nutrition. Furthermore, Dietitian should involve the family members in post-stroke nutrition recommendation as the family members are the one who will engage in patients' common aspects of feeding such as assisting with feeding, modifying foods, and preparing a healthy diet to keep a healthy weight and prevent a recurrent stroke. Besides, stroke cases requires active nutritional assessment and care to identify and treat malnutrition as soon as possible. In short, nutrition intervention in combination with medical treatment can put stroke survivors on the road to returning to normal, healthy life.

CONSENT

Verbal consent was obtained from the patient.

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DECLARATION OF CONFLICT OF INTERESTS

The authors declared no potential conflicts of interest with respect to the preparation and publication of this article.

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