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Original Article

DOI: https://doi.org/10.3329/jninb.v8i2.63748

Journal of National Institute of Neurosciences Bangladesh,
July 2022, Vol. 8, No. 2, pp. 136-142

ISSN (Online) 2518-6612
ISSN (Print) 2410-8030

Complications Associated with Nasogastric Tube Feeding among Stroke Patients at a Tertiary Hospital in Dhaka City

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[**Received on:** 22 April 2022; **Accepted on:** 12 May 2022; **Published:** 1 July 2022]

Abstract

Background: Many stroke patients develop swallowing difficulty and require nasogastric feeding for the maintenance of nutrition. **Objectives:** The purpose of the present study was to evaluate the complications of nasogastric tube feeding practice on stroke patients. **Methodology:** This cross-sectional study was conducted from April 2014 to September 2014 in the Department of Medicine at Dhaka Medical College Hospital, Dhaka, Bangladesh. Adult patients aged between 18 to 70 years with stroke was enrolled in the study. The diagnosis of stroke was established by the clinical presentation and neuroimaging. Patients requiring nasogastric tube feeding was included in the study and were systematically examined for any complications related to use of nasogastric tube. Their caregivers were also thoroughly interviewed using a standard pre formed questionnaire regarding any complications as well. **Results:** Of the 100 patients studied, most common age group for stroke was 51 to 60 years (53.0%). Male to female ratio was 2.22:1. In this study population, 63.0% patients had ischaemic stroke; 26.0% had haemorrhagic stroke; 9.0% population had subarachnoid haemorrhage. The most common indication for NG feeding was difficulty in swallowing (39.0%). Other common indications were semi-consciousness (26%), unconsciousness (22.0%), inability to maintain feed (10.0%). Around 71.0% of the patients had complications from NG tube feeding. Out of them, 53.0% of the patients had nasal irritation, 40.0% patients developed aspiration pneumonia. 38.0% of the patients developed diarrhea, 53.0% had tube blockage. 43.0% of the patients had electrolyte imbalance and tube displacement, 18.0% of the patients were malnourished. **Conclusion:** In conclusion nasogastric tube feeding is associated with various complications which can increase the morbidities in stroke patients. *[Journal of National Institute of Neurosciences Bangladesh, July 2022;8(2):136-142]*

Keywords: Nasogastric tube feeding; stroke; Ischaemic stroke; haemorrhagic stroke; Sub-arachnoid haemorrhage

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Conflict of interest: There is no conflict of interest relevant to this paper to disclose.

Funding agency: This research project was not funded by any group or any institution.

Contribution to authors: Rahman GMH, Taslima AAU were involved in protocol preparation, data collection and literature search and manuscript writing. Rahman HMM, Ahmed F, Siddiq AB were involved in preparation and revision of this manuscript.

How to cite this article: Rahman GMH, Siddiq AB, Taslima AAU, Rahman HMM, Ahmed F. Complications Associated with Nasogastric Tube Feeding among Stroke Patients at a Tertiary Hospital in Dhaka City. J Natl Inst Neurosci Bangladesh, 2022;8(2):136-142

Introduction

Dysphagia occurs in up to 50.0% of patients admitted to hospital with hemispheric stroke[1-4]. Up to 27.0% cases remain at risk of aspiration by seven days, and up to 8.0% have to swallow problems six months after their stroke with 1.7% still requiring tube feeding[5-6]. Nutritional supplementation can reduce mortality in older people at risk of malnutrition, although this has not been shown specifically in the context of stroke[7]. During the period when patients with stroke are unable to take

their full dietary requirements normally the delivery of a liquid feed through a fine bore nasogastric tube is commonly used. The tube is usually secured with adhesive tape around the tube and to the patients face, and is often hooked behind the ear. Unfortunately, nasogastric tubes may be dislodged, due to confusion, restlessness, communication and attention disorders during handling or normal movement.

Partial dislodgement may leave the tube misplaced in the lungs, leading to a risk of aspiration. Dislodgement means that the tube needs to be positioned, possibly causing distress and discomfort to the patient. Re-sitting takes up nursing staff time, and may require a chest X-ray to confirm that the tip of the tube is in the stomach especially in the light of recent guidance, adding further costs and inconvenience[8]. With multiple re-sittings, and the associated delays, the amount of food that is delivered by conventional nasogastric tube may be significantly below the intended amount[9,10]. This gives rise to a risk of malnutrition, which is associated with poor outcomes[11-13]. The burden of patients presenting with stroke makes a bulk of the patients who get admitted to various hospitals in Bangladesh including Dhaka Medical College Hospital (DMCH) where it was the top cause of admission in the year 2010[14]. Many of them required nasogastric tube feeding due to dysphagia. Though, this form of feeding is done mostly by nursing staff in developed countries, but in Bangladesh it is done solely by patient's attendants due to shortage of manpower in public hospitals. Unfortunately, most of them cannot comply with standard practice due lack of education, hospital setting, and many other causes which may lead to adverse hospital outcomes of this group of patients due to the complications.

Nasopharyngeal discomfort occurs frequently in patients with nasogastric tubes and many suffer sore mouths, thirst, swallowing difficulties, and hoarseness[15]. Short-term oesophageal damage can include oesophagitis and ulceration from local abrasion and gastro-oesophageal reflux, occurring in up to 12.5% of neurological patients[16]. Nausea occurs in 10.0% to 20.0% of patients and abdominal bloating and cramps from delayed gastric emptying are also common[15,17-48]. Diarrhoea occurs in up to 30.0% of enterally fed patients on medical and surgical wards and more than 60.0% of patients on intensive care units. It can create serious problems from nutrient, fluid, and electrolyte losses, and from infected pressure sores and general patient distress[18-22]. Aspiration may occur with no obvious vomiting or coughing, and pneumonia can develop silently. Tube can easily be blocked as well[15]. The purpose of the present study was to evaluate the complications of nasogastric tube feeding practice on stroke patients.

Methodology

Study Population and Settings: This cross sectional study was conducted from April 2014 to September 2014 in the Department of Medicine at Dhaka Medical College Hospital, Dhaka Bangladesh. Adult patients aged between 18 to 70 years of both sexes diagnosed as stroke having a nasogatric tube feeding were included in this study. The study was done by purposive type non probability sampling technique. After getting Institutional review board approval subjects were selected on the basis of enrollment criteria. Written informed consent was taken from all patients. The ethical clearance number of the protocol was CPS-712/2012/PSN1574.

Study Procedure: The diagnosis of stroke was established by the clinical presentation, neuroimaging (CT scan/ MRI). Patients requiring nasogastric tube feeding was included in the study and were thoroughly examined for any complications from possible use of nasogastric tube. Their caregivers were also thoroughly interviewed using a standard pre formed questionnaire regarding any complications as well. Semi-structured questionnaires were formed that include all the variables of interest. This questionnaire was used for collection of information by interviewing patients. The questions were designed to elicit details of the use of nasogastric feeding, its associated complications ad possible underlying factors of these complications. The maximum time to take an interview was 1 hour. Data collection was consisting of interviews, medical history, physical examination, consultation records and completion of specific protocol. Patients were explained about the procedure. Tube was marked at a distance equal to that from the xiphisternum to the nose via the earlobe (50–60 cm). Tube was lubricated externally with gel/water. Nasal patency was checked by ''sniff'' with each nostril occluded in turn. The clearer nostril could be sprayed with lignocaine to avoid discomfort. Patients were sited upright with the head level. Tube was slide gently backwards along the floor of the clearer nostril until visible at the back of the pharynx (10–15 cm). Patients were asked to take a mouthful of water and then advance the tube 5–10 cm as they swallow in cooperative cases. Water swallow/advance was repeated until the preset mark on the tube reaches the nostril. Tube was withdrawan at any stage who were distressed, coughing, or cyanosed. When there was

difficulty passing the tube, patients were asked to tilt their head forwards or turn it to one side. Once in place, position of the tube was checked before use. Position of a tube was checked by injecting air through it and listening for bubble with a stethoscope or by an x ray. Tube insertion was documented in the patient's notes. Fine bore 5–8 French gauge NG tubes were used. Administration of 200–400 ml of feeds were given through a feeding tube over 15–60 minutes at regular intervals. . Bolus feeding could be performed using a 50 ml syringe, either with or without the plunger. Nasogastric tube insertion related complications were assessed.

Ethical Assurances for Protection of Human Rights: No data or any information was collected without permission of the participant. Participation in this study were fully voluntary. The respondents were remain entirely free to withdraw their participation at any time of the study. Written informed consent was taken from each patient. Prior to consent they were explained the aim and purpose of the study. Confidentiality was assured and anonymity was maintained; no participants were identified in any report or publication under this study.

Statistical Analysis: Computer based statistical analysis was carried out with appropriate techniques and systems. After collection of information, these data were checked, verified for consistency and edited where necessary. After editing and coding, the coded data were entered directly into the computer by using SPSS/PC software. Data cleaning validation and analysis were performed using the SPSS/PC software and graph and chart by MS excel. The results were presented in tables and graphs.

Results

A total number of 100 patients were recruited for this study. Most of the population was belonged to 51 to 60 years group (53%). About 38.0% of the subjects belonged in the 61 to 70 years age group, 4.0% to the less than 40 year age group and 5% to the >70 year age group. Again 69.0% of the population was male and 31.0% cases was female (Table 1).

Table 1: Socio-demographic Characteristics of the Study Subject According to Age (n=100)

Characteristics	Frequency	Percent
Age Group		
Less Than 40 Years	4	4.0
51 to 60 Years	53	53.0
61 to 70 Years	38	38.0
More Than 70 Years	5	5.0
Gender		
Male	69	69.0
Female	31	31.0

In this study, 63% patients had ischaemic stroke, 26% had haemorrhagic stroke. Sub arachnoid haemorrhage was found in 9% population and aneurysmal bleeds in 2% population of study group (Figure I).

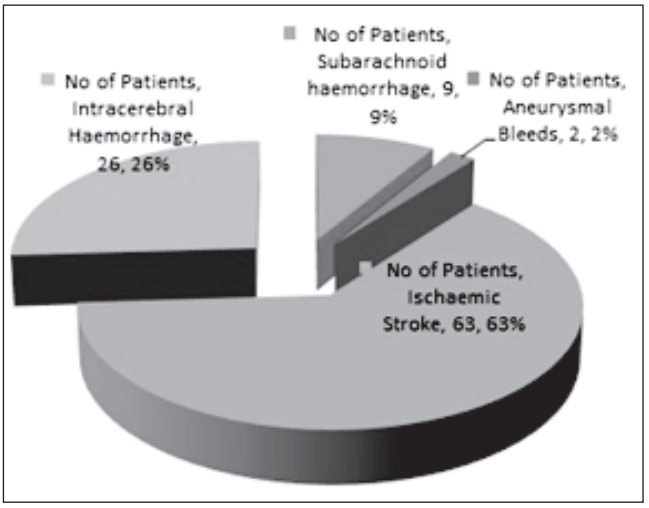

Figure I: Distribution of Different Types of Stroke

Table 3 showing hypertension was the most common (75.67% in hemorrhagic stroke and 88.88% with ischemic stroke). Other important risk factors were smoking (48.64% and 65.07%) and diabetes mellitus (24.32% and 25.39%). Dyslipidaemia was found 30.15% in Ischaemic and 35.13% in haemorrhagic stroke.

Table 3: Distribution of Stroke with Different Risk Factors (n=100)

Risk Factors	Haemorrhage	Infarction
HTN	28(75.67%)	56(88.88%)
Smoking	18(48.64%)	41(65.07%)
Diabetes	9(24.32%)	16(25.39%)
Dyslipidaemia	13(35.13%)	19(30.15%)
IHD	11(29.72%)	15(23.80%)
Previous H/O TIA, CVD	1(2.70%)	3(4.76%)
Drugs(OCP)	0	3

While evaluating the indications for nasogastric feeding, it was found that the most common indication was difficulty in swallowing (39.0%). The next common indication was altered consciousness. 26.0% of patients were given NG tube as they were semiconscious and 22.0% patients due to

unconsciousness. 10.0% of patients were unable to maintain their adequate feeding despite being able to eat orally and given NG tube. 3.0% patients were at the extreme of ages, unable to eat and so were given NG tube (Figure II).

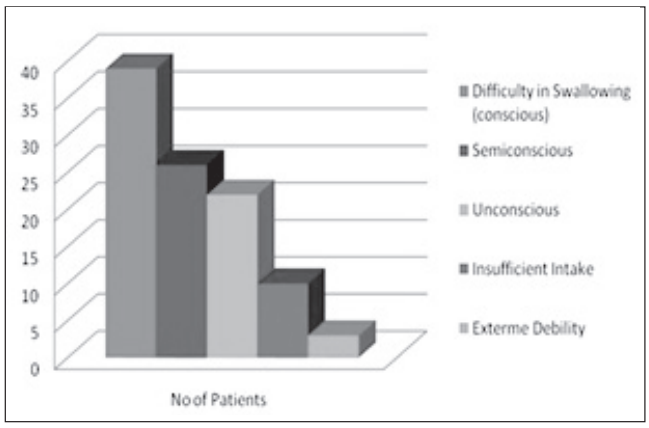

Figure II: Indications of Use of Nasogastric tube in Various Stroke Patients

Among the 100 patients studied, 71 had complications attributed to NG tube feeding. The most common complication was nasal irritation in patients who were (38). The second most common complication was aspiration pneumonia which was found in 29 of patients. Diarrhoea was found in 27 patients, electrolyte imbalance in 31 patients. 38 of the respondents complained of tube blockage some of which resulted in tube removal and reintroduction. 31 patients had tube displacement at some point of time. 13 patients were malnourished due to inadequate feeding. Some patients had more than one complication at the same time (Figure III).

In comparison, of the 29 patients who developed aspiration pneumonia, 13(44.0%) was suffering from ischaemic stroke, 16(55.0%) was suffering from haemorrhagic stroke. 24(63.0%) of the patients who

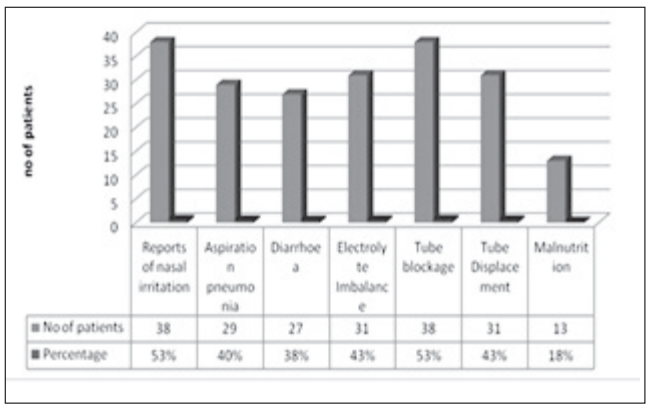

Figure III: Complications Associated with Nasogastric Tube Feeding (n=71)

reported nasal irritation was suffering from ischaemic stroke, 14(36.84%) was suffering from haemorrhagic stroke. Diarrhoea was reported by both ischaemic stroke 55% and haemorrhagic stroke (44.4%) patients.

Electrolyte imbalance was found in both ischaemic stroke (45.16%) and haemorrhagic stroke (54.83%) patients. Tube blockage was reported more in haemorrhagic group (52.63%) than the other group (47.37%). Tube displacement was experienced by both group of patients (45.0% and 54.0% respectively). Malnutrition was found in both group of patients (53% in ischaemic stroke, 46.0% in haemorrhagic stroke) (Table 4).

Table 4: Comparison between Complications and Type of Stroke (n=71)

Type of Complication	Ischaemic Stroke	Haemorrhagic Stroke
Aspiration Pneumonia	13(44%)	16 (55%)
Nasal Irritation	24 (63%)	14 (36.84)
Diarrhoea	15(55.5%)	12(44.4%)
Electrolyte Imbalance	14(45.16%)	17(54.83%)
Tube Blockage	18(47.37%)	20(52.63%)
Tube Displacement	14(45.16%)	17(54.83%)
Malnutrition	7(53.84%)	6(46.15%)

Discussion

This cross sectional study was carried out with an aim to evaluate the complications of nasogastric tube feeding practice on stroke patients. A total 100 Adult patients aged between 18 to 70 years of both sexes diagnosed with different types of stroke who required NG tube for feeding purpose were included.

Among the age distribution, most population belonged to 51 to 60 years group (53%). 38% of the subjects belonged in the 61 to 70 year age group, 4.0% to the <40 year age group and 5% to the more than 70 year age group. In this study, 69% of the population was male and 31.0% is female. A study by Hussain et al49 showed that Most of the patients suffering from stroke were male (74.0%) and most of them were between 51-70 years of age (69.0%) which correlates to our study finding although another study done in DMCH among young stroke patients show slightly higher percentage (M: F 52:47) regarding sex distribution. This might be related to age of the subjects as many factors influence stroke in different age group[14-48]. In this study 63.0% patients had ischaemic stroke, 37.0% had haemorrhagic stroke. Among the haemorrhagic stroke, intracerebral haemorrhage 26.0%, subarachnoid haemorrhage 9.0%

and aneurysmal bleeds in 2.0% was found. Similar findings have been described by Hussain et al[49] where ischaemic stroke was 61.0%, haemorrhagic stroke was 39%. Another study in DMCH describes incidence of hemorrhagic stroke to be 20.0% whereas that of ischemic to be 80% which is a bit higher than our study finding. Higher rate of haemorrhagic stroke is also have been reported in number of hospitals in Asian countries such as Singapore, Malaysia (33.0%) Thailand (30.0%), Korea (31.0%), Taiwan (31.0%). One of the cause of high incidence of haemorrhagic stroke in our hospital based present study may be due to the acute admission is more related to haemorrhagic stroke, availability of neurosurgical intervention at DMCH and DMCH being a tertiary referral center[14, 48].

Analysis of different risk factors revealed that hypertension was the most important risk factor of stroke (75.67% in hemorrhagic stroke and 88.88% with ischemic stroke). Other important risk factors were smoking (48.64% and 65.07%) and diabetes mellitus (24.32% and 25.39%) respectively. Dyslipidaemia was found 30.15% in ischaemic and 35.13% in haemorrhagic stroke patients. The association of hypertension is more with ishchemic stroke. The result correlates with that of a study in India where hypertension was found to be the most important risk factor[54]. Two Bangladeshi studies by Siddique et al53 and Hossain et al49 also describes similar findings[48,53]. Smoking appears as an important risk factor in both hemorrhagic and ischemia stroke in this study. 54 patients, 13 (49.14%) of hemorrhagic stroke and 41(65%) patients of ischemic stroke were smokers. This study correlates with Donnan et al[54] who found smoking as a strong risk factor for SAH and cerebral infarction and Siddique et al[53] also shared similar findings[53-54]. In their study, association of stroke with some other factors such as underlying heart disease, dyslipidaemia, diabetes mellitus were analyzed. These findings were comparable to other studies done in Bangladesh and abroad. In this study 26 cases had IHD. Similar study by Hayee et al[56] found that 29.66% of the patients were suffering from different heart diseases. Ischaemic heart disease definitely augments the risk of stroke[56]. Present study showed that 24.32% of the stroke patients were diabetic which was similar with the study in India. Framingham study has shown that 10-14.7% of the stroke patients were Diabetic. In BIRDEM a study on 165 cases of diabetic patients, all of them developed stroke in less than 10 years duration[61].

In this study, out of 100 patients who required NG tube following stroke were selected as per the inclusion criteria. A study by Miah et al[62] showed that as high as 78% of the stroke patients required NG tube feeding for stroke. Indications for NG tube feeding were analyzed in this study population. The most common indication for NG tube feeding was dysphagia (39.0%). It has been reported that dysphagia can occur up to 50% of patients following stroke[1-4]. In a study by Miah et al[62] 24.0% were fed via NG tube for dysphagia. In this study, 26% of the patients were semiconscious whereas 22.0% of the patients were unconscious following stroke. Two Bangladeshi studies showed that alteration of consciousness is a common finding in stroke where they report it to be 54.0% and 59.0% respectively[49,53]. This study showed total 48.0% of the patients required NG tube feeding for alteration of consciousness which is comparable to the results of Miah et al[62]. It has been observed that 10.0% of the patients were given NG tube feeding due to poor intake and 3% for extreme debility. Patients who are capable of swallowing liquids and food may have a poor appetite because of the effects of intercurrent illness or medication and they may eat more slowly or be less keen to eat because of facial weakness, lack of dentures or poor arm function64. A Bangladeshi study reported this cause to be 22.0% which is comparable to this study[62].

Out the 100 patients studied, 71 patients had complications. Nasal irritation was reported by 38(53%) of patients. To the best of our knowledge no study has been done in our country regarding the complications of NG tube feeding. Among the complications studied in western countries, following NG tube insertion, nasal irritation is one of the more common one and it is more prevalent in those requiring large bore ones[31-35]. In this study, it was a very common complication and was reported by the most respondents. A possible explanation is that the size of the NG tube commonly used in our hospital is wide bored which is more prone to cause nasal irritation.

The second most common complication was aspiration pneumonia in our patients which was found in 29(40%) of patients. A western study found that up to 27.0% remain at risk of aspiration by seven days. These results show a higher percentage. Possible reasons might be due to the fact that the whole feeding process is done in our setting by untrained persons[5]. Gastro-oesophageal reflux occurs frequently with NG tube feeding. It is more common when patients are NG fed in the supine position and reflects a combination of gravitational back flow and impairment of gastro-oesophageal sphincter function induced by pharyngeal stimulation and the presence of the tube across the cardia. It is very common in patients with impaired consciousness or poor gag

reflexes, occurring in up to 30% of those with tracheostomies and 12.5% of neurological patients[16,65-66]. Aspiration may occur with no obvious vomiting or coughing, and pneumonia can develop silently. To minimize risks of aspiration, patients should be fed propped up by 30° or more, and should be kept propped up for 30 minutes after feeding[15]. Acid suppression or sucralfate may help with symptoms of oesophagitis, but they do not prevent aspiration pneumonia. When asked, most of the respondents replied that the patients were propped up during the feeding. but the duration for which they remained so was not consistent as most patients could not maintain the position due to lack of hospital facilities. These included bed structure (no back support available), some patients being in the floor due to lack of beds and another important reason being not adequate people all the time for maintenance of the posture.

Diarrhoea was found in 27(38.0%) patients. In this study, the figure is a bit higher than other studies described. Ng tube feeding related diarrhoea occurs in up to 30.0% of enterally fed patients on medical and surgical wards and more than 60.0% of patients on intensive care units[18-22]. In developed parts of the world, the food preparation technique, the food handling, the material of the food are of high quality. That might be the reason for the lower percentage reflected in their studies. Even then, the underlying causes for diarrhoea are food contamination, drugs, antibiotic associated diarrhoea[30]. In DMCH, the food preparation technique is difficult as patients attendants are required to prepare the food, they rely solely on supply water for food and the environment is mostly contaminated.

Conclusion

The present study provides information regarding the various complications that arise as a result of NG tube feeding in stroke patients. Stroke patients make up a bulk of hospital admission in tertiary hospitals and will continue to do so. NG tube feeding is an important part of managing the nutritional part of these patients. But unfortunately it is neglected as well. This study highlights the fact that a very high percentage of NG tube fed patients developed various complications and ultimately lead to adverse hospital outcome.

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