ORIGINAL ARTICLE

Dysphagia among Older Patients in a Teaching Hospital, Selangor

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ABSTRACT

Introduction: The number of older adults suffering from dysphagia (difficulty in swallowing) has been increasing over the years. This is genuinely concerning as dysphagia may affect one's quality of life, which can then lead to death if left untreated. This study aimed to determine the factors associated with socio-demographic, medical background, anthropometry, dietary intake, risk of malnutrition, and functional status with dysphagia among older patients in Hospital Sultan Abdul Aziz Shah (HSAAS). **Materials and methods:** This cross-sectional study was conducted among subjects aged 60 and older in Hospital Sultan Abdul Aziz Shah (HSAAS), Universiti Putra Malaysia (UPM), Serdang, using purposive sampling. A set of questionnaires containing seven sections which included sociodemographics, anthropometry, medical background, dietary intake, risk of malnutrition, functional status, and presence of dysphagia were distributed. Meanwhile, Pearson's chi-square test and Fisher's Exact Test were used to determine the association between variables. **Results:** 104 eligible subjects joined this study with a mean age of 69.4 years (6.7 years). Out of 104 subjects, 11.5% were reported to have dysphagia. Based on the statistical analysis, significant associations were found between marital status (p= 0.011), BMI (p= 0.028), dietitian referral (p>0.001), energy adequacy (p= 0.008), protein adequacy (p= 0.004) and risk of malnutrition (p= 0.008) with dysphagia. **Conclusion:** This study investigated the prevalence and factors associated with dysphagia among older adults in HSAAS. The results revealed an 11.5% prevalence of dysphagia, with significant associations found between dysphagia and marital status, BMI, dietitian referral, energy and protein adequacy, and malnutrition risk. These findings underscore the importance of comprehensive dysphagia management involving multidisciplinary healthcare teams to address nutritional deficiencies and improve patient outcomes.
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INTRODUCTION

Dysphagia is defined as difficulty swallowing and is usually experienced by older adults; thus, it is categorised as a geriatric syndrome (1). Older adults naturally experience many physiological changes due to ageing, and these natural changes may cause a reduction in swallowing function. For instance, cerebral atrophy, the decline in nerve function, and reduction in muscle mass are common physiological changes that occur due to ageing that may affect the swallowing function, thus leading to dysphagia (2). Moreover, ageing may increase the risk of older adults experiencing certain diseases or conditions, such as cerebrovascular accidents, Parkinson's disease, and cancer, which can cause swallowing difficulties (2).

A systematic review paper reported that the prevalence of older adults suffering from difficulty swallowing was 5% to 72% in community-dwelling settings and were undetected until admitted into a hospital (3). On the other hand, a study conducted by Popman et al. (2018) in New Zealand found that the prevalence of older adults aged 85 years and older in the hospital with a risk of dysphagia was 29.5% (4). Another study conducted at Loma Linda University Medical Center by Bomze et al. (2021) among patients aged 65 and older mentioned that the prevalence of patients with dysphagia was 24% (5). Furthermore, a study conducted in Japan among older

adults admitted into a healthcare centre mentioned that the prevalence of dysphagia among older adults was 30% (6).

In Malaysia, a study conducted by Husmeela et al. (2021) among patients in Hospital Kuala Lumpur and the National Cancer Institute has reported that 43.3% of the patients were diagnosed with dysphagia. Meanwhile, a study conducted in Queen Elizabeth Hospital, Kota Kinabalu, Sabah, among patients attending speech and language therapy, found that 34.2% of the patients were diagnosed with dysphagia. Among the 34.2% diagnosed with dysphagia, 42.4% were aged 60 years and above (8). However, Husmeela et al. (2021) stated that there is still limited data representation when it comes to the prevalence of dysphagia in Malaysia for all age groups. Dysphagia is often undetected, thus causing patients to receive inappropriate treatment (9). This is very concerning as dysphagia is associated with more extended hospitalization and many health complications, which can lead to higher treatment costs (1). Bomze et al. (2021) mentioned that the average length of hospital stay is nine days; however, patients with dysphagia had a significantly more extended hospital stay of 13.6 days. Dysphagia can also lead to malnutrition as the reduced swallowing ability can influence dietary intake and cause muscle mass and strength reduction (10). Another study reported that lower intake of vitamin A, vitamin E, and manganese was observed among individuals with chewing and swallowing difficulties (11). This is because older adults suffering from dysphagia may avoid certain foods that are essential for health, such as fruits and vegetables, due to their swallowing disability (11). Furthermore, dysphagia can reduce the quality of life among individuals as they may suffer from impaired social and psychological well-being (1). Thiyagalingam et al. (2021) mentioned a study conducted in Europe where a large number of residents in a nursing home no longer found eating to be an enjoyable activity as the residents experienced anxiety during mealtimes. This led to the residents choosing to eat alone or, worse, skipping meals altogether (1). Furthermore, dysphagia is also associated with a higher mortality rate, which can lead to death if left untreated (1).

Despite the physiological changes that occur due to ageing, certain conditions may aggravate the occurrence of dysphagia among older adults. Thus, it is suggested to identify the factors associated with dysphagia for treatment and prevention (Aslam & Vaezi, 2013). Therefore, the purpose of this study was to determine the factors associated with socio-demographic, medical background, anthropometry, dietary intake, risk of malnutrition, and functional status with dysphagia among older patients in Hospital Sultan Abdul Aziz Shah (HSAAS), Universiti Putra Malaysia, Serdang.

MATERIALS AND METHODS

Ethics Approval

This study received ethical approval from the National Medical Research Register (NMRR) with the reference number NMRR-20-308-52632 and Jawatankuasa Etika Universiti Untuk Penyelidikan Melibatkan Manusia (JKEUPM) with reference number UPM/TNCPI/RMC/1.4.18.2 (MREC-JKEUPM).

Study Design and Recruitment of Subjects

This was a cross-sectional study with convenience sampling. The targeted participants were older patients aged 60 years or and older in Hospital Sultan Abdul Aziz Shah (HSAAS), Universiti Putra Malaysia, Serdang. The sample size was calculated using the formula for correlation study by Hulley et al. (2013) with 10% of non-response rate. The subjects that participated in this study were screened based on the inclusion and exclusion criteria. The inclusion criteria included Malaysian citizens who meet the cut-off point to be categorized as older adults according to the United Nations which is at least 60 years old. Additionally, the subject and/or caregiver must be able to speak and understand Malay and/or English to aid the researcher during the interview session for data collection. On the other hand, subjects who are unconscious or have mental disabilities were excluded from this research. This is because some of the questions in the questionnaire required the subjects to think and memorize certain things such as the 24-hour diet recall. Moreover, subjects must be conscious and mentally able to obtain their consent before participating in the study. Other than that, subjects who were admitted to the hospital due to terminal illness with a life expectancy of less than six months were also excluded from the study. Subjects who were taking normal diet, hospital diet, oral nutritional support, and enteral feeding were included in this study; however, subjects on parenteral feeding were excluded.

Study instruments

Socio-demographic

The socio-demographic data were obtained directly from the medical records or through an interviewing technique with the subjects and caregivers. The socio-demographic data was used to collate the background characteristics of the subjects which included sex, ethnicity, religion, educational status, marital status, and living status.

Anthropometry

For the anthropometry measurement, the height and weight of the subjects were obtained to calculate the subjects' body mass index (BMI). The primary method to obtain the subjects' weight and height was using a

digital weighing scale and stadiometer. If the subjects could not stand independently or had other conditions that may cause difficulty obtaining the measurements, the anthropometry data were obtained directly from the subjects' medical records, or by using the estimated formula.

Estimated formula for weight:
Male; Weight = [(1.10 x KH) + (3.07 x MUAC)] – 75.81.
Female; Weight = [(1.01 x KH) + (2.81 x MUAC)] – 66.04
[KH = knee height; MUAC = mid-upper arm circumference]

(Ross Lab, 2002)

Estimated formula for height:
Male; Height (cm)= 64.19 – (0.04 x age) + (2.02 x KH)
Female; Height (cm)= 84.88 – (0.24 x age) + (1.83 x KH)

(Chumlea et al., 1984)

This study used the Queensland (2017) BMI cut-off for the BMI classification for older adults where less than 23 kg/m2 is considered underweight, 24 to 30 kg/m2 is normal weight, and more than 30 kg/m2 is overweight/obese (29). This BMI classification was used for older adults as it was found that BMI between 24 to 31 kg/m2 had the lowest risk of mortality among community-dwelling elderly (29).

Medical background

The medical background of the subjects was obtained from the medical records and through an interviewing method. There were eight questions under this section which were (1) reason(s) of admission, (2) date of admission, (3) date of discharge, (4) days of hospitalization, (5) comorbidity, (6) number of prescribed medications, (7) seen by dietitian and (8) presence of caregiver. For question number five regarding comorbidity, six comorbidities were listed, which were diabetes mellitus, hypertension, chronic kidney diseases, dyslipidaemia, cardiovascular disease, and cancer.

Dietary intake

Two consecutive days, 24-hour diet recall was chosen to observe the usual intake of the subjects in the hospital. The two-days 24-hour diet recall may represent weekday and/or weekend intake. This diet recall method was selected as a previous study has suggested that this method is a valid tool for estimating energy and nutrient intake (31). Afterward, the total calorie and protein intake were calculated using Nutritionist Pro.

Risk of malnutrition

The instrument used to identify the risk of malnutrition among the subjects was the Mini Nutritional Assessment-Short Form (MNA-SF) (30). The MNA-SF has six questions with a maximum score of 14 points. The questionnaire includes food intake declined, involuntary weight loss, mobility, psychological stress or acute disease, neuropsychological problems, and BMI or calf circumference if the BMI is unavailable. The scores are categorised into three categories: normal nutrition status (12-14 points), at risk of malnutrition (8-11 points), and malnourished (0-7 points).

Functional status

The hand-grip strength test using a Jamar Plus Digital Hand Dynamometer set at the second handle position was used to measure the subjects' functional status. According to Lee & Gong (2020), the hand-grip strength test can measure the strength and ability to grasp objects, reflecting an individual's ability to conduct daily functional activities (12) during the assessment. Subjects were positioned in a seated position with their elbow flexed at 90o. The subjects grasped the Jamar Plus Digital Hand Dynamometer as hard as possible until its value stopped increasing. This procedure was repeated twice on both hands for accuracy. The Asian Working Group for Sarcopenia (AWGS) (2014) cut-off value was used where the values of ≥ 26 kg (male) and ≥ 18 kg (female) were considered as normal values for hand-grip strength.

Presence of dysphagia

The presence of dysphagia in this study was reported directly from the subjects' medical records. Subjects with dysphagia received a note from the language and speech therapist regarding the presence and condition of dysphagia. The notes from the language and speech therapist were obtained during the subjects' current admission. Therefore, the presence of dysphagia among the subjects still existed and was not yet cured.

Data analysis

The data analysis was done using IBM SPSS Statistics version 26 with a significance level of $p<0.05$. The normality of the data was examined before starting the analysis. Descriptive statistics were used, and the data were presented in frequency, percentage, mode, mean, median, and range. Descriptive statistics were used to represent the characteristics of the subjects and the presence of dysphagia. On the other hand, inferential statistics was used to test the association between socio-demographic, medical background, anthropometry, dietary intake, risk of malnutrition, and functional status with dysphagia among the subjects in HSAAS. Pearson's chi-square test and Fisher's Exact Test were used to determine the association between the independent variables (socio-demographic, medical background, anthropometry, dietary intake, risk of malnutrition, and functional status) and the dependent variable (presence of dysphagia).

RESULTS

Characteristics of the subjects

One hundred four eligible subjects joined the study with

a mean age of 69.4 (SD 6.7), where 77.9% (n=81) were 60 to 74 years old. The majority of the subjects were male (60.6%), Malay (72.1%), and Muslims (74.0%). Almost half of the subjects received a secondary education level (49.0%), 95.2% (n=99) were married, and 82.7% lived with family, children, or relatives. It was also found that 80.8% (n=84) of the subjects were presented with two or more diseases, and only 18.3% (n=19) had either one comorbidity or no comorbidities. The highest comorbidity that was reported among the subjects was hypertension (85.6%), followed by diabetes mellitus (DM) (62.5%), dyslipidemia (49.0%), chronic kidney disease (CKD) (17.3%), cancer (8.7%) and cardiovascular disease (CVD) (6.7%) as represented in Table I. In terms of polypharmacy, Subjects who are taking five or more medications are marked as polypharmacy in the questionnaire. This study found that 81.8% (n=71) of the subjects took five or more medications during their hospital stay.

Table I: Characteristics of the Subjects (n=104)

Characteristics	n (%)	Mean ± SD
Age, year		69.4 ± 6.7
60 – 74	81 (77.9)	
≥75	23 (22.1)	
Sex		
Male	63 (60.6)	
Female	41 (39.4)	
Ethnicity		
Malay	75 (72.1)	
Chinese	19 (18.3)	
Indian	10 (9.6)	
Religion		
Islam	77 (74.0)	
Hindu	7 (6.7)	
Buddha	15 (14.4)	
Christian	5 (4.8)	
Educational Status*		
Non-formal	4 (3.8)	
Primary	19 (18.3)	
Secondary	51 (49.0)	
Tertiary	28 (26.9)	
Marital Status		
Single/divorced/widowed	5 (4.8)	
Married	99 (95.2)	
Living Status		
Alone	4 (3.8)	
With family/children/relatives	100 (96.2)	
Presence of Comorbidities		
Yes	84 (80.8)	
No	19 (18.3)	
Comorbidities		
Hypertension	89 (85.6)	
Diabetes Mellitus	65 (62.5)	
Dyslipidemia	51 (49.0)	
Chronic Kidney Disease	18 (17.3)	
Cancer	9 (8.7)	
Cardiovascular Disease	7 (6.7)	

CONTINUE

Table I: Characteristics of the Subjects (n=104). (CONT.)

Characteristics	n (%)	Mean ± SD
Polypharmacy		
<5	18 (18.2)	
≥5	71 (81.8)	
Weight, kg		66.4 ± 17.7
Height, cm		158.0 ± 24.0
Body Mass Index, kg/m²*		
Underweight	37 (35.6)	
Normal	44 (42.3)	
Overweight/obese	20 (19.2)	
Dietitian Referral*		
Yes	41 (39.4)	
No	62 (59.6)	
Feeding Assistance		
Dependent	18 (17.3)	
Minimal-moderate dependent	5 (4.8)	
Independent	81 (77.9)	
Energy adequacy		
Inadequate (<75%)	71 (68.3)	
Adequate (75-100%)	25 (24.0)	
Excessive (>100%)	8 (7.7)	
Protein adequacy		
Inadequate (<75%)	61 (58.7)	
Adequate (75-100%)	28 (26.9)	
Excessive (>100%)	15 (14.4)	
MNA-SF Nutritional Status		8.8 ± 2.9
Normal	17 (16.3)	
At risk	52 (50.0)	
Malnourished	32 (30.8)	
Handgrip-strength, kg		18.2 ± 10.0
Lower	68 (65.4)	
Normal	21 (20.2)	
Dysphagia		
Yes	12 (11.5)	
No	92 (88.5)	

* Missing values

For the anthropometry measurement, the mean for weight, height, and BMI are 66.4kg (SD= 17.7 kg), 158cm (SD= 24.0 cm), and 26 kg/m2 (SD= 5.3 kg/m2), respectively. The number of subjects with normal BMI was the highest, with 42.3% (n=44) of the subjects with BMI between 24 kg/m2 to 30 kg/m2, followed by underweight (<24 kg/m2) with 35.6% (n=37) and overweight or obese (>30 kg/m2) with 19.2%(n=20).

Among the 104 subjects, 39.4% (n=41) were referred to a dietitian during the subjects' hospital stay, and 77.9% (n=81) of the subjects required no feeding assistance, while 17.3% (n=18) of the subjects required full feeding assistance. The feeding assistance that was provided to the subjects was in the form of tube feeding and spoon feeding.

It was also found that only 24% (n=25) of the subjects were able to reach energy adequacy of 75% to 100%. In comparison, 7.7% (n=8) had excessive energy

adequacy above 100%, and 68.3% (n=71) had less than 75% inadequate energy intake. The highest number of energy adequacy by the subjects was less than 75%; meanwhile, subjects with excessive energy adequacy were the lowest.

For protein adequacy, 58.7% (n=61) of the subjects had less than 75%, 26.9% (n=28) had 75% to 100%, and 14.4% (n=15) had more than 100%. The findings found that protein adequacy of less than 75% was the highest; meanwhile, protein adequacy of more than 100% was the lowest among the subjects.

The MNA-SF was used to determine the risk of malnutrition among the subjects, and it was found that the mean score was 8.8 (SD= 2.9). This finding shows that the number of subjects at risk of malnutrition was the highest with 50.0% (n=52), which is equivalent to half of the subjects at risk of malnutrition, followed by 30.8% (n=32) of the subjects who were malnourished and 16.3% (n=17) of the subjects who were normal. The total number of subjects for the research was 104; however, there was missing data on the risk of malnutrition. This is because some of the subjects' BMI and calf circumference could not be obtained due to the difficulty in measuring the knee height and calf circumference as the subjects' legs were either amputated, swollen (edema), or in pain.

The mean of the handgrip-strength test was 18.2 kg (SD= 10.0 kg). More than half of the subjects in this study had a low handgrip strength, and only 20.2% (n=21) had normal handgrip strength. This shows that most of the subjects had lower functional status. The number of subjects who could conduct the handgrip-strength test was only 89 subjects instead of 104. During data collection, some subjects mentioned that they could not grip the Jamar Plus Digital Hand Dynamometer properly due to hand pain or weakness.

Among the 104 subjects, 11.5% (n=12) were diagnosed with dysphagia. The prevalence of dysphagia among older patients in HSAAS is lower when compared to other literature. The lower prevalence of older patients diagnosed with dysphagia in HSAAS may be related to the fact that HSAAS is still considered a newly established hospital, as it was first operated to the public back in 2020. This led to the researcher obtaining a smaller sample size than other literature. In addition, the socio-demographic background of the subjects, as well as the setting of the study, may have also contributed to the lower prevalence of dysphagia reported. For instance, the prominent age of the subjects in this study was 60 to 74 years old. This socio-demographic characteristic may have led to the lower prevalence of dysphagia, as many studies have reported that the prevalence of dysphagia increases with age. On the other hand, other studies used different instruments to measure dysphagia, such as EAT-10; meanwhile, this study used subjects' medical records to report the prevalence of dysphagia. Even though the prevalence of dysphagia among older patients in HSAAS is lower when compared to other literature, the prevalence of dysphagia reported is still concerning, as 11.5% is still relatively high.

Relationship between independent variables and dependent variable

Using Pearson Chi-square test and Fisher's Exact Test, it was found that marital status (p=0.011), BMI (p=0.028), dietitian referral (p<0.001), energy adequacy (p=0.008), protein adequacy (p=0.004) and risk of malnutrition (p=0.008) were significantly associated with dysphagia among the subjects in HSAAS. The relationships between the variables are presented in Table II.

Table VII: Relationship between Independent Variables and Dependent Variables, p<0.05

Variable	Dysphagia		Total	χ^2	p-value
	Yes	No			
	n (%)				
Marital Status				12.085[a]	0.011*
Single/divorced/widowed	3 (25.0)	2 (2.2)	5 (4.8)		
Married	9 (75.0)	90 (97.8)	99 (95.2)		
Body Mass Index, kg/m^2				6.692[b]	0.028*
Underweight	8 (72.7)	29 (78.4)	37 (36.6)		
Normal	3 (27.3)	41 (45.6)	44 (43.6)		
Overweight/obese	0 (0.0)	20 (22.2)	20 (19.8)		
Dietitian Referral*				20.539[a]	<0.001*
Yes	12 (100.0)	29 (31.9)	41 (39.8)		
No	0 (0.0)	62 (68.1)	62 (60.2)		
Energy adequacy				8.759[b]	0.008*
Inadequate	4 (33.3)	67 (72.8)	71 (68.3)		
Adequate	5 (41.7)	20 (21.7)	25 (24.0)		
Excessive	3 (25.0)	5 (5.4)	8 (7.7)		

CONTINUE

Table VII: Relationship between Independent Variables and Dependent Variables, p<0.05. (CONT.)

Variable	Dysphagia		Total	χ^2	p-value
	Yes	No			
	n (%)				
Protein adequacy				13.317[b]	0.004*
Inadequate	4 (33.3)	57 (62.0)	61 (58.7)		
Adequate	2 (16.7)	26 (28.3)	28 (26.9)		
Excessive	6 (50.0)	9 (9.8)	15 (14.4)		
MNA-SF Nutritional Status				8.409[b]	0.008*
Normal	0 (0.0)	17 (18.9)	17 (16.8)		
At risk	3 (27.3)	49 (54.4)	52 (51.5)		
Malnourished	8 (72.7)	24 (26.7)	32 (31.7)		

a= Pearson Chi-Square Test
b= Fisher's Exact Test

DISCUSSION

As mentioned previously, out of 104 subjects, 12 subjects were diagnosed with dysphagia which has a lower prevalence when compared to past studies. One factor that may have contributed to this finding is how dysphagia is diagnosed in HSAAS. As mentioned previously, the diagnosis of dysphagia among the subjects was obtained directly from language and speech therapist notes. This may have led to underreporting of dysphagia among patients with mild dysphagia as the symptoms are not severe leading to the dismissal of the doctor's referral to the language and speech therapist for swallowing assessment.

This study found no significant association between socio-demographics and dysphagia except for marital status (p=0.011). A consistent finding was observed when compared to a previous study conducted by Chen et al. (2020), where the number of subjects with dysphagia was higher among the unmarried subjects. Moreover, a previous study conducted in Japan also found a significant association between marital status and tongue pressure (13). The association between marital status and dysphagia may be related to lower eating motivation as the subjects have to eat alone with no company, leading to malnutrition and dysphagia. This explanation is similar to the study conducted by Chen et al. (2020).

On the other hand, no significant association was found between age and dysphagia in this study. This finding contradicts most literature that was able to find a significant association between age and dysphagia, where the number of subjects at risk or diagnosed with dysphagia increases with age (5,10,14). A study conducted by Bomze et al. (2021), mentioned that a one-year increase in age can increase the probability of having dysphagia by 5%; thus, a significant association may be observed in studies with higher mean age among the subjects (5). However, the present study found no significant association between age and dysphagia. This may be due to the subjects' age distribution as more than half of the subjects (77.9%) in the present study are categorized as young elderly (aged 60 to 74 years) and only 22.1% were 75 years and older. Additionally, it was also observed that the mean age for studies that found a significant association between age and dysphagia were 76.6, 80.3, and 80.2 years; meanwhile, the mean age for the present study was 69.4 years.

In addition, no significant association was found between sex and dysphagia. This study's finding is similar to a survey conducted by Bomze et al. (2021) that reported no significant association between sex and dysphagia. However, a few studies had found a significant association between sex and dysphagia, where the prevalence of males with dysphagia was higher than women (16,17); meanwhile, a study conducted by Lim et al. (2018) reported that females were higher risk than males. A study conducted by Wolf et al. (2021), concluded that the number of male subjects diagnosed with dysphagia was higher compared to female subjects in hospital settings as it was documented that male subjects are more likely to be transferred to hospitals at advanced stages of disease. Furthermore, another study found that the prevalence of dysphagia was higher among males as males experience greater age-related decline in muscle strength including the muscles responsible for swallowing when compared to females (17). Alternatively, Lim et al (2018) found that elderly women have a 1.8 times higher risk of developing dysphagia compared to elderly men due to the physiological changes within the muscles.

In terms of educational status, a previous study conducted by Lim et al. (2018) in Korea found an association between education status and dysphagia (p<0.001). The study conducted by Lim et al. (2018) reported that individuals with higher educational levels were more prominent in the non-dysphagia risk group. This is because most individuals with higher educational levels understand nutrition more deeply. However, the present study had contradicting results compared to previous literature as no significant association was reported.

Next, this study has found no significant association between living status and dysphagia among the subjects

in HSAAS. This is consistent with previous literature conducted by Lim et al. (2018). However, this previous study found that the number of subjects with dysphagia was higher among those who lived alone (18). Despite that, this study has shown a higher prevalence of dysphagia among subjects who live with family, children, or relatives (91.7%) compared to those living alone (8.3%). This outcome may be due to the subjects' socio-demographic characteristics, as most subjects in this study were reported living with their families.

The anthropometry measurement used in this study was the subjects' BMI. It was found that there was a significant association between BMI and dysphagia (p=0.028). A consistent finding was observed between this study and previous literature conducted by da Silva et al. (2020) and Ko et al. (2022) (20,21). This literature found that the prevalence of subjects with dysphagia was higher among those who were underweight. Similarly, the present study has also found that subjects with dysphagia were higher among those who were underweight. 72.7% out of the 12 subjects with dysphagia were underweight, and 27.3% were under the normal weight category for their BMI. Meanwhile, no subjects that were overweight or obese were reported with dysphagia. Ko et al. (2022) mentioned that the association between BMI and dysphagia was related to malnutrition caused by insufficient nutrition intake due to swallowing difficulty. Insufficient nutrition intake caused by swallowing difficulty may lead to weight loss, thus resulting in more older patients presenting with dysphagia among those who were underweight.

Dietitian referral (p>0.001), energy adequacy (p=0.008), and protein adequacy (p=0.004) had a significant association with dysphagia. A significant association was found between dietitian referral and dysphagia, as all the subjects presented with dysphagia were referred to dietitians. When it comes to managing dysphagia, a multidisciplinary team is required, and one of the healthcare professionals that is needed in this team is a dietitian (1). Positive outcomes have been shown from having dietitians in the dysphagia managing team, as dietary modification is required. The dietary modification for dysphagia patients is derived from the National Dysphagia Diet, where different textures of food will be provided to the patients according to the severity of dysphagia. Furthermore, dietitian referral is critical as diet modification for dysphagia patients may lead to low energy intake; thus, patients may benefit from enteral feeding, which is typically prescribed by a dietitian. Due to this reason, all the patients in HSAAS that were presented with dysphagia were referred to a dietitian.

A significant association was found between energy adequacy and dysphagia. This finding was aligned with a previous study conducted by Wakabayashi et al. (2018), where a significant association was found between energy intake and dysphagia. The study used the Food Intake Level Scale (FILS) as the instrument for energy intake and found that FILS was lower among those with sarcopenic dysphagia (22). Additionally, Ko et al. (2022) also found that subjects with dysphagia consumed less amount of food compared to subjects without dysphagia. In another study, significant differences were found between the mean energy intake with the dysphagia group and non-dysphagia group (p=0.042) with the mean energy intake of 1188 kcal/day and 1382 kcal/day, respectively (23). Dysphagia often causes individuals to feel insecure when consuming food due to the fear of choking; therefore, most individuals will eat small portions with limited food options.

The present study has also found that protein intake and dysphagia were significantly associated. This study had similar findings as a previous study that reported that older adults with dysphagia had an average protein intake of only 0.60 g/kg body weight per day, which does not meet the daily protein requirement of at least 1.0 g/kg body weight/day based on the ESPEN (2019) guideline (24). The food choices and portions among older adults with chronic dysphagia were reported to be lower as the older adults experience difficulty swallowing, leading to nutrient deficiency (24). In a previous paper, skeletal muscle, including the muscle responsible for swallowing, may experience anabolism due to protein deficiency due to lower insulin-like growth factor-1 (IGF-1) production (25). It was also mentioned that adequate protein intake is essential for older adults with sarcopenia as it can improve tongue muscle strength, preventing sarcopenic dysphagia (25). In another past study, it was found that there was no significant association between protein intake and dysphagia (p=0.201) (p=0.201); however, subjects with dysphagia had lower protein intake compared to subjects without dysphagia, with a mean protein intake of 70.01 g and 99.94 g, respectively (26). This past study also highlighted that one of the factors influencing low protein intake is the fear of eating and difficulty during oral feeding due to swallowing difficulty (26).

A significant association was found between the risk of malnutrition and dysphagia (p=0.008). This study had a consistent outcome with previous literature. For instance, a survey conducted by Tran et al. (2021) reported a significant association between malnutrition and dysphagia (p<0.05), as the prevalence of subjects with dysphagia was higher among those at risk of malnutrition or malnourished. It was also reported that malnutrition and dysphagia are similar to a vicious cycle as dysphagia can lead to malnutrition, and malnutrition may also lead to dysphagia (27); thus, a strong relationship can be seen between malnutrition and dysphagia. Moreover, a previous study found that 87.9% of older adults diagnosed with dysphagia were either at risk of malnutrition or malnourished (28). The present study has similar results as previous literature as

72.7% of the subjects diagnosed with dysphagia were malnourished based on the MNA-SF score, and 27.3% of the subjects were at risk of malnutrition. In contrast, no subjects with average MNA-SF scores were reported to have dysphagia.

This study fills the gap in the existing research as there are still limited studies on the factors associated with dysphagia among older adults in Malaysia. In addition, the data and method of this study can act as a reference for new and future research. Moreover, the study may provide insight to nutritionists, dietitians, and other healthcare professionals on the underlying factors associated with dysphagia in order to develop, improve, and standardize new treatment and management. However, there were limitations in this study. First, the inability to reach the sample size of 108 subjects due to time constrain and the limited number of patients in the wards. It was observed that there were a limited number of older adult patients in HSAAS that were available during data collection. In terms of time constrain, the ethics approval from NMRR expired in May; thus, the data collection was only conducted for four months. Second, the potential bias when assessing subjects' two-day 24-hour diet recall. Subjects as well as caregivers may have underreported what the subjects have eaten during the 24-hour diet recall for two days in the hospital. This is evidenced by majority of the subjects having underreporting value of less than 1.2. Third, the study design of this study cannot determine the cause and effect of dysphagia among the subjects. Some of the variables associated with dysphagia have been reported to be bidirectional. For instance, malnutrition can cause dysphagia and at the same time, malnutrition may be the effect of dysphagia. The study design of this study was unable to determine what was the cause or effect of dysphagia among the subjects.

CONCLUSION

Despite a lower prevalence of dysphagia compared to previous studies, 11.5% of subjects were diagnosed with dysphagia among older adults in HSAAS. The study revealed that marital status, BMI, dietitian referral, energy adequacy, protein adequacy, and malnutrition risk are significantly associated with dysphagia. Importantly, the study underscores the multifactorial nature of dysphagia, with significant nutritional implications. The findings suggest that dysphagia management requires a multidisciplinary approach, involving dietitians for dietary modifications to ensure adequate nutrition and mitigate malnutrition risks. The study's limitations, including a smaller sample size, potential bias in dietary recall, and the inability to determine causality, suggest the need for further research. Nonetheless, this study fills a gap in understanding dysphagia among older adults and provides valuable insights for healthcare professionals to improve treatment and management strategies for dysphagia.

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