

Nutritional Status and Factors Affecting Food Intake among Hospitalized Patients in Hospital Ampang

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ABSTRACT

The study aims to measure the current nutritional status and factors contributing to food consumption during hospitalization at Hospital Ampang. This is a cross-sectional study of 206 patients consisting of 104 males and 102 females respectively between 18 to 70 years of age. Data obtained from Factors Influencing Dietary Intake of Hospitalized Patients Questionnaire and Nutritional Risk Screening (NRS 2002). We used standardized methods to measure weight, height. Body weight categories were defined based on Body Mass Index (BMI). The BMI of participants was $26.08 \pm 4.56 \text{ kgm}^{-2}$ and 52.0% (107) of participants had low risk of malnutrition and at risk of malnutrition. 85.4% admitted that the food tasted different. To conclude, patients' low consumption of food during hospitalization should be enhanced. Thus, it is essential to implement effective strategies and interventions to increase dietary intake among hospitalized patients to fulfill their nutritional requirements and encourage quick recovery.

Keywords: food intake, hospitalized patients, malnutrition, nutritional status

INTRODUCTION

Hospital food service is of the utmost importance in food provision to more than 75% of hospital patients (Andersson *et al.* 2013). Food consumption during hospitalization is determined by the quality of food and beverages which might have an impact on patients' recovery (Norshariza *et al.* 2019; Osman *et al.* 2022). Additionally, it is the responsibility of a hospital's food and nutrition service to provide adequate diets to patients and the meal provided must supply sufficient nutrients that can maintain or restore nutritional status during acute or chronic disease state (Gomes *et al.* 2020). However, barriers experienced by patients due to current illness can affect their food intake during hospitalization such as difficulty in swallowing and chewing and psychosocial factors include food beliefs and stress (Norshariza *et al.* 2019). Other factors also suggested by Kontogianni *et al.* (2020) can be

classified into modifiable (food smell and taste) and less modifiable factors (decreased appetite). Food consumption of less than or equal to 50% is considered as low and it was found that 31% of patients consume low food intake during hospitalization (Allard *et al.* 2015).

The occurrence of reduced food intake over time can lead to inadequate energy, protein, and essential nutrients that could eventually lead to malnutrition (Bellanti *et al.* 2022). The World Health Organization (WHO) defined malnutrition as insufficient dietary intake to meet the nutrient requirement set by the health organization which can be classified into undernutrition and overnutrition (WHO 2019). Disease-Related Malnutrition (DRM) has significantly increased globally among hospitalized patients by 20 to 50% (Correia *et al.* 2017; Hiesmayr *et al.* 2019). Malnutrition was also prevalent in Malaysia with 35.4% of geriatric patients diagnosed with malnutrition aligning with the global

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prevalence (Sahran *et al.* 2016). An increment of malnutrition prevalence has been recorded among geriatric patients at 61.7% using Subjective Global Assessment (SGA) as the nutritional assessment tool (Abd Aziz *et al.* 2018). Negative consequences associated with malnutrition include high mortality rates, increased hospital stays, and lower discharge rates (Osman *et al.* 2022). The nutritional status of patients is assessed using Nutritional Risk Screening (NRS 2002) by recommendations made by European Society for Clinical Nutrition and Metabolism (ESPEN) for hospitalized patients (Kondrup *et al.* 2003). Malnutrition is more prevalent in elderly patients, however, there still needs to be more data on adult patients which will be the aim of this study and identifying factors affecting patients' food intake during hospitalization.

METHODS

Design, location, and time

The present study performed a cross-sectional research design among patients admitted to the adult medical wards. This study was conducted in Hospital Ampang, located in Selangor, Malaysia, covering a time frame from December 2022 to July 2023.

The ethics and data collection approval was obtained from the Ministry of Health, Malaysia (NMRR-22-01126-SKH (IIR)) on 10 February 2023.

Sampling

A method of random selection used to determine eligible respondents from the hospital admission list, and 104 males and 102 females participated in the study after receiving prior consent from the patients themselves.

Participants were provided with a structured online questionnaire to determine the factors that influence the dietary intake of hospitalized patients. The questionnaire consisted of three sections: socio-demographic questions, nutrition-related questions, and inquiries regarding the factors that impact patients' food consumption. In addition, the questionnaire includes inquiries about the quality of hospital meals that involve appearance, smell perception, taste experience, tactile sensation, serving size, hygiene standards, temperature, and availability. Regarding anthropometry measurement, weight

and height were measured using standardized methods, and body weight categories were defined based on Body Mass Index (BMI). The BMI of the participants calculated using a formula weight in kilograms divided by height in meters squared kgm^{-2} . A one-day 24-hour diet recall performed to estimate the total energy intake and macronutrients consumed by the patients. Then, NRS-2002 was used to identify patients' risk of malnutrition by considering some dynamic parameters including recent weight loss, current BMI, recent food intake, and disease severity (Reber *et al.* 2019).

Data collection

Following receiving a daily hospital admission list, patients were chosen for inclusion in the study by a random selection process that adhered to the predetermined criteria for inclusion and exclusion. To be eligible for participation in the study, patients were required to have been admitted to the hospital for at least one night and should not have been admitted to a pediatric, psychiatric, acute care, or post-natal unit (Tah *et al.* 2020). In addition, individuals who were in a critical condition, characterized by an inability to take food orally, reliance on mechanical ventilation for breathing, adherence to a prescribed diet, receiving nutrition by parenteral or enteral means, or undergoing fasting in anticipation of a surgical procedure or diagnostic test, will be immediately dismissed. Before initiating the research, individuals will be approached within the selected ward and provided with an explanation regarding the study's objectives. After getting consent from the participant, researchers will measure their anthropometry measurement, perform a 24-hour diet recall and distribute an online questionnaire regarding Factors Affecting Food Intake among Hospitalized Patients. Apart from that, from the one day 24-hour diet recall, the total calorie intake and macronutrient composition were analyzed using the Nutritionist Pro Software. Regarding the differences in energy requirements among individuals, the energy requirements of the participants were estimated using the Schofield equations from 1985 (ref). The determination of Basal Metabolic Rate (BMR) takes into account factors such as gender, age, weight, and height, which then multiplied by the individual's Physical Activity Levels (PAL). In addition, the

Recommended Nutrient Consumption (RNI) 2017 was used as a reference point in determining the required daily energy consumption, protein, and fiber requirements for all study participants.

Data analysis

Descriptive analysis including means, percentages, and frequencies was applied to organize, describe, and summarize the data regarding socio-demographic factors, anthropometric measurements, and factors influencing food intake. Furthermore, a Pearson correlation analysis was performed on a sample of individuals admitted to the hospital to ascertain whether any relationships exist between the NRS score and the patients' energy intake, BMI, and Length of Stay (LOS).

RESULTS AND DISCUSSION

Socio-demographic

By referring to inclusion and exclusion criteria, two hundred and six participants were recruited among Malay ethnicity and from medical wards. 104 (50.5%) of the participants were male with an average age of 42.13±13.91 and females were 39.51±13.89 years old. The average length of stay was 2.83±1.96 days with 49% being diagnosed with type 2 diabetes.

Nutritional status

Malnutrition is assessed based on patients' current nutritional status, malnutrition risk score, and dietary intake. The mean BMI of male patients is higher compared to female patients. However, there is no statistically significant mean difference between BMI (p=0.24). Based on Table 1, the highest BMI category recorded was overweight, 44.2% and 30.1% of patients were obese. Recorded data had shown a higher prevalence of overweight and obese (74.2%) compared to research conducted by National Health and Morbidity Survey (NHMS) in 2019 where 50.1% of the Malaysian population were obese and overweight. Previous studies conducted in Selangor have recorded a higher prevalence of obesity among the female population which contradicts with our findings, where 34% of male patients were obese while only 28% of female patients were obese (Mohd-Sidik *et al.* 2021).

The overall dietary intake of patients is exceeding 75% of the nutrient requirement which is a good sign of adequate nutrients during hospitalization. However, male and female patients are low in fiber intake with a mean of 7.01±8.63 g and 5.58±3.64 g from a total of 20 g per day (Table 2). Apart from that, the mean difference of fiber intake between female and male patients is not statistically significant

Table 1. Anthropometric and NRS-2002 score data of the hospitalized patient

Variables	Male (n=104) (Mean±SD)	Female (n=102) (Mean±SD)	Total (n=206) (Mean±SD)	p	%
Height (m)	1.68±0.05	1.58±0.07	1.63±0.08		
Weight (kg)	75.11±13.09	63.99±12.71	69.60±14.03		
BMI (kgm ⁻²)	26.45±4.49	25.70±4.62	26.08±4.56	0.24 ^a	
BMI category					
Underweight (<18.5 kgm ⁻²)	1	1	2		0
Normal (18.5–22.9 kgm ⁻²)	19	32	51		24.8
Overweight (23.0–27.4 kgm ⁻²)	50	41	91		44.2
Obese Class I (27.5–32.4 kgm ⁻²)	27	17	44		21.4
Obese Class II (32.5–37.4 kgm ⁻²)	5	9	14		6.8
Obese Class III (≥37.5 kgm ⁻²)	2	2	4		1.9
Malnutrition risk, NRS-2002 score					
No risk (0)	44	55	99		48.1
Low risk (1–2)	58	47	105		51.0
At risk (3–4)	2	0	2		1.0

^aIndependent t-test, the significant difference at p<0.05: BMI: Body Mass Index; NRS: Nutritional Risk Screening

Table 2. Dietary intake of the patient during hospitalization

Variables	Male Mean± SD	Female Mean±SD	<i>p</i>	Male (n)	Female (n)	%
Energy	1,441.25±381.93	1,151.41±169.39				
25%				1	0	0.5
50%				9	1	4.9
75%				44	64	52.4
100%				50	37	42.2
Protein	54.68±23.13	41.07±11.87				
25%				2	0	1.0
50%				7	8	7.3
75%				23	39	30.1
100%				72	55	61.7
Fibre	7.01±8.63	5.58±3.64	0.125 ^a			
25%				33	54	42.2
50%				62	37	48.1
75%				8	9	8.3
100%				1	2	1.5
Carbohydrate	202.37±166.43	173.0±31.5				
Fat	52.83±21.51	33.04±11.39				

^aIndependent t-test, the significant difference at $p < 0.05$

($p = 0.125$; 95% CI: -0.40, 3.25). Different findings were discovered by Fernstrand *et al.* in 2017 as there is a statistically significant difference of mean fiber intake between female and male indicating 12.5 g and 10.9 g, respectively. This study showed that male patients tend to consume more fiber from cereal and grain whereas female patients consume higher fiber sources from fruit.

Malnutrition is considered by the World Health Organization (WHO) as the significant threat to public health worldwide, affecting 20 to 60% of hospitalized patients. Malnutrition risk screening among patients in Hospital Ampang revealed that almost half of the patients were not experiencing malnourishment however 52% were low and at risk of malnutrition, which align with WHO findings. A statistically significant association exists between malnutrition risk score and weight status ($p < 0.05$). This contradicts Zhang *et al.*'s findings in 2022 among Covid-19 patients, as the malnutrition risk category was among patients with lower BMI.

Malnutrition risk score had shown an association with energy intake and Length of Stay LOS (Table 3). There is a statistically significant, inverse, and fair association between

malnutrition risk score and the energy intake of patients. Patients at risk tend to have decreased food intake due to numerous reasons including decreased appetite, nausea or vomiting, feeling tired and not feeling hungry (Kontogianni *et al.* 2020). Yalçın *et al.* (2018) discovered the same findings, where energy intake and nutrient consumption were lower among patients who were at risk of malnutrition compared to well-nourished patients. Next, the malnutrition risk score has poor correlation with length of stay. Few previous studies have found that more extended hospital stays are significant among patients diagnosed with malnutrition with a mean

Table 3. Association between malnutrition risk score with weight status, energy intake, and length of stay

Variables	BMI	Energy intake	LOS
NRS score	0.259 ^a	-0.425 ^a	0.178 ^a
	(<0.001) ^b	(<0.001) ^b	(0.017) ^b

BMI Body Mass Index; LOS: Length of Stay

NRS: Nutritional Risk Screening

Factors affecting food intake among hospitalized patients

of 12.6 days (Corkins *et al.* 2014). Furthermore, malnourished general patients had longer LOS, and prolonged treatment duration with a higher risk of morbidity. Besides, malnutrition has been an independent factor for longer LOS (Yalçın *et al.* 2018).

Factors affecting food intake among hospitalized patients

Five categories of factors affecting adequate food intake including organizational issues, quality and satisfaction with food, effects of illness on food intake, choice, and eating difficulties.

The finding shows that satisfaction with food was the common reason influencing patients' dietary intake during admission (Table 4). 85.4% agreed that the taste of the food provided by the hospital tasted differently and 41.7% did not like the taste of the food respectively. Meanwhile, 82% complained that food could have been more appealing. A therapeutic diet to suit patients'

health conditions might have some modifications in terms of taste, texture and appearance which potentially increases the probability of inadequate energy intake among patients (Williams & Walton 2011). Along the same lines as the recent findings, Kontogianni *et al.* 2020 noted in their study that 13.6% of patients dislike the food taste which may be altered by individual factors such as underlying health issues, medicine, or even age itself.

Regarding the aspect of the organization, 2.4% of respondents expressed dissatisfaction with their inability to select their preferred food options. Furthermore, 6.3% of participants felt that the hospital environment was not appealing and it was noted that a majority of 99.5% disagreed with the statement that they had missed meals as a result of hospital procedures. In contrast, a study conducted by Kontogianni *et al.* (2020) found that around 7% of patients who missed a portion of their meals reported doing so due to needing a medical checkup or surgical procedure. Generally,

Table 4. Factors affecting food intake among hospitalized patients

Factors	Frequency (n)		
	Agree	Disagree	Not applicable
Organizational			
Missed meals (hospital procedure)	0 (0.0)	205 (99.5)	1 (0.5)
Eating environment was not appealing	13 (6.3)	192 (93.2)	1 (0.5)
Not able to choose food	5 (2.4)	200 (97.10)	1 (0.5)
Satisfaction with food			
Food taste different	176 (85.4)	29 (14.1)	1 (0.5)
I do not like the taste of the food	86 (41.7)	119 (57.8)	1 (0.5)
Food is not appealing to me	169 (82.0)	36 (17.5)	1 (0.5)
Effect of illness on food intake			
Do not have usual appetite	143 (69.4)	62 (30.1)	1 (0.5)
I normally eat less than what was served	49 (23.8)	155 (75.2)	2 (1.0)
I feel nausea and vomiting	12 (5.8)	193 (93.7)	1 (0.5)
Choices			
I do not like the food offered	164 (79.6)	42 (20.4)	
Not hungry at that time	6 (2.9)	199 (96.6)	1 (0.5)
I do not enjoy eating alone	0 (0.0)	206 (100.0)	
Eating difficulties			
I feel pain	3 (1.5)	202 (98.1)	1 (0.5)
Chewing/swallow problem	7 (3.4)	198 (96.1)	1 (0.5)
Uncomfortable eating position	-	205 (99.5)	1 (0.5)

hospital environments were considered as “not conducive to eating,” which might significantly influence patients' appetite and food consumption (Osman *et al.* 2022). To enhance the overall food consumption of patients, various interventions have been demonstrated to be successful, including protected mealtimes, enhancing the mealtime environment, and providing mealtime support (Osman *et al.* 2022).

The decrease in appetite and the resulting decrease in food consumption were caused by administering medications and treatment. Patients reported various symptoms including nausea, gastrointestinal pain, reflux, stomatitis, diarrhea, and constipation (Hope *et al.* 2017). This conclusion aligned with the findings that 69.4% of individuals did not have their usual appetite. A total of 23.8% of individuals consumed a quantity of food that was lower than the amount provided, while 5.8% reported experiencing symptoms of nausea and vomiting. It was supported by a study conducted by Aminuddin *et al.* (2018), which found that only 11% of patients consumed the whole meal that was provided to them. Therefore, it may be determined that, on average, 35% of the food served to patients at various hospitals was wasted.

Moreover, the reality of a limited selection of food options was associated with a decline in overall food consumption, as seen by the agreement of 79.6% of respondents who expressed dissatisfaction with the food offered by the hospital. This finding aligns with a study conducted by Aminuddin *et al.* (2018), whereby it was observed that patients expressed dissatisfaction with the quality of food due to a limited range of options available on the menu because there is no menu distribution provided by the Malaysian public hospitals. In terms of eating difficulties, only 1.5% complained that feeling pain affect their dietary intake, 3.4% had swallowing problems and none had issues with eating position upon admission. Thus, this finding indicated that eating difficulties were not the main reason for reducing food intake during admission.

CONCLUSION

In conclusion, there was a significant rate of low risk, and no risk of malnutrition on admission was discovered, with just 1% of patients at risk

of malnutrition. Moreover, this study revealed a positive correlation between elevated BMI and LOS with a greater probability of malnutrition. Meanwhile, it was discovered that a decrease in calorie intake was associated with a higher risk of malnutrition. This study has provided valuable insight into factors affecting food intake among hospitalized patients. Satisfaction with food provided by the hospital was the primary obstacle to adequate food consumption and eating difficulties were not the main factor of inadequate food intake among hospitalized patients.

Based on the findings of this study, some recommendations could be made to inform future interventions in Factors Affecting Food Intake Among Hospitalized Patients. While this study only provided data on Malay patients, this limitation should be considered for future studies to have diverse participants by including other races so that the study results can be generalized when it comes to intervention. Other than that, by identifying the factors that influence food intake among hospitalized patients, future studies need to focus on developing efficient interventions to enhance the quality of food service within hospital settings. This will help to improve patients' dietary intake so that they get a sufficient amount of food during their hospitalization.

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DECLARATION OF CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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