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Nutritional Status and Factors affecting Food Intake among Hospitalised Patients in Hospital Al-Sultan Abdullah

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Abstract
Hospital food intake can impact patients' nutritional status, resulting in a lengthier hospital stay or a higher mortality rate. This study aimed to investigate the nutritional status and the factors influencing the food intake of patients at Hospital Al-Sultan Abdullah (HASA). Malnutrition risk was assessed using Nutritional Risk Screening 2002, and factors affecting food intake were investigated using a questionnaire. Participants' weight and height were estimated using the anthropometry assessment formula. The body mass index was 25.3 ± 8.1 kg/m^2 and 70.6% (113) posed no risk of malnutrition. Food tasting differently (48.8%) was the highest affecting factor in food intake.

Keywords: food intake; hospitalised patients; nutritional status; malnutrition

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1.0 Introduction

Nutritional intake and the systems that control appetite, satiety, and hunger are complex physiological processes. These processes significantly impact nutritional status, determined by dietary consumption, a well-balanced supply of macronutrients and micronutrients, and fluid intake (Reber et al., 2019). Patient's health status and recovery during hospitalisation also rely on adequate nutritional intake as it is one of the crucial elements in healthcare. However, most patients need more nutritional requirements, and up to 50% of hospitalised patients are malnourished (Roberts et al., 2020). In addition, ill persons may struggle to achieve their nutritional and hydration needs for various reasons (Reber et al., 2019). However, patients' nutrition adequacy is also influenced by organisational factors such as hospital food service, mealtime surroundings, and how hospitals and staff provide nutrition care (Roberts et al., 2020).

Hospital food services are comprised of three significant stages: inputs, processes, and outputs (Kim et al., 2010). It is recognised that hospital food service substantially impacts a patient's overall impression of their hospital stay (Aminuddin et al., 2018). Malnutrition can occur due to inadequate nutritional monitoring, a protracted period of insufficient dietary intake during inpatient hospitalisation, or increased nutritional requirements during rehabilitation (Charlton et al., 2010). Hospital malnutrition is a significant problem throughout Southeast and Northeast Asia. Malnutrition prevalence ranged between 4% and 100% in 28 hospital studies (southeast and northeast Asia), with more than 60% of studies finding a malnutrition prevalence of more than 40% (Inciong et al., 2020). Malnutrition is related to

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substantial clinical aspects in hospitalised patients, including viral and non-infectious complications, prolonged length of stay (LOS), increased re-admission, impaired wound healing, and an increased risk of death (Inciong et al., 2020). Additionally, poor clinical outcomes associated with malnutrition increase healthcare costs and place a considerable economic burden on healthcare systems (Inciong et al., 2020). There is a need to explore the factors influencing nutritional intake among hospitalised patients. Thus, this study aimed to determine the malnutrition risk and the factors that impact food intake among hospitalised patients.

2.0 Literature Review

2.1 Hospital Food Service

The food service in the hospital is a crucial component of patient care, as it aids in their recuperation (Gomes et al., 2020). Hospitals in most high-income nations serve all meals as part of regular treatment. Menus produced for hospital meals are often controlled by local or national menus and nutrition standards to ensure that patients' nutritional needs are satisfied (Tran et al., 2019). From preparation to delivery, the hospital's food service must consistently offer safe food that fulfils specified nutritional quality and adequacy, palatability, and temperature criteria (Gomes et al., 2020). Therefore, meals supplied to patients during their hospitalisation are integral to treatment and rehabilitation (Gomes et al., 2020). Each hospital's food and nutrition service should be responsible for providing adequate diets to patients. The hospital diet should ensure an adequate supply of nutrients to the hospitalised patient, allowing them to maintain and recover their nutritional status (Gomes et al., 2020).

2.2 Nutritional risk screening

Nutritional risk screening methods are beneficial in the daily routine to detect possible or apparent malnutrition quickly (Reber et al., 2019). Such tools should be easy to use, rapid, inexpensive, standardised, and verified (Reber et al., 2019). The NRS-2002 is one of the most frequently utilised nutritional risk screening instruments in hospitals globally (Kondrup, 2003). The NRS-2002 is a straightforward and well-validated instrument that includes a four-question pre-screening. If one of these questions is answered affirmatively, a screening provides surrogate measures of nutritional status, static and dynamic parameters, and information on the disease's severity (Reber et al., 2019).

2.3 Malnutrition among hospitalized patients

In the United States, malnutrition is widespread among hospitalised patients. Malnutrition was diagnosed in 1,248,680 hospital discharges (3.2%) in the United States in 2010. Since 1993, the number of patients with a malnutrition diagnostic code has quadrupled, implying that malnutrition in hospitalised patients has risen (Corkins et al., 2014). As for Malaysia, malnutrition issues are also becoming concerning among hospitalised patients. In 2010, the research found that 55.2% of 181 elderly patients at the University of Malaya Medical Centre were malnourished, with 18.0% having a body mass index (BMI) of 18.5 kg/m^2 (Harith et al., 2010). In addition, 21% of senior patients at Malaysia's Geriatric Ward of the University Malaya Medical Centre are malnourished according to the Global Indicators of Malnutrition (GIM) (Abd Aziz et al., 2017). Among adult patients, a recent study shows that 127 (36.3%) patients were identified as having moderate to severe malnutrition, according to the SGA done by a dietitian (Tah et al., 2020).

Malnutrition has been linked to poor patient outcomes such as increased infection and complication rates, muscle loss, poor wound healing, extended hospital stays, and increased morbidity and death. As evidence, studies show that during admission to the rehabilitation unit, 24.4% of the 45 post-acute stroke patients were malnourished, and 66.7% of the patients were at risk of malnutrition (Chong et al., 2019). Given the consequences of malnutrition, it is probable that poor nutritional status has a detrimental impact on stroke rehabilitation and slows stroke patients' recovery from malnutrition (Chong et al., 2019). Hospitals can reduce malnutrition issues by improving meal quality and patient meal experiences, which should help to maximise food intake and lessen the detrimental effects of malnutrition on hospital patients.

2.4 Factors affecting food intake among hospitalized patients

Factors linked to reduced food intake in hospitalised patients can be divided into modifiable and non-modifiable categories. First, the patient's physical and clinical state may impact their food consumption (Kontogianni et al., 2020). For example, illness symptoms include a loss of appetite, being too sick, or feeling pain when eating is difficult to overcome. This factor has been proven in trials where patients who were exhausted, nauseated/vomiting, or did not feel hungry had a higher risk of reducing but not eliminating their meal consumption (Kontogianni et al., 2020). Furthermore, patients with gastrointestinal disorders also reported a higher risk of eating only a quarter or none of the meals offered. In contrast, cancer diagnosis reduced but did not eliminate food consumption (Kontogianni et al., 2020).

Aside from clinical conditions, improper food preparation or transportation and serving procedures impairing food palatability contribute to hospitalised patients' low meal intake (Kontogianni et al., 2020). Previous research has found that various food attributes and quality factors, such as taste, diversity, flavour, meal temperature, and meat and vegetable texture, had the most significant impact on satisfaction, influencing the patient's low food intake (Chemah et al., 2018). A patient's low food intake also can result in plate waste. According to a study in Selangor, Malaysia, 21% of plate waste by the population is due to the taste of food, the temperature of food, portion, and hospital ambiance, while the remaining 79% is due to other variables (Chemah et al., 2018). Additionally, the physical and social surroundings of the hospitalised patients may impact their food consumption (Kontogianni et al., 2020). There is also an unmet requirement for help during feeding (Kontogianni et al., 2020). Previous research found that 42.2% of patients did not receive assistance when requested, and 30.1% had trouble opening packages/unwrapping food (Keller et al., 2015). Furthermore, the ward environment

and the negative psychological impact of other patients' medical conditions can reduce patients' willingness and desire to eat (Kontogianni et al., 2020). It has been observed that 38.9% were disturbed by activity, noise, or odour, and 41.8% had their meals interrupted by staff (Keller et al., 2015). Another possible explanation is that they dislike the hospital food, particularly the therapeutic diet, which may further limit their food intake (Kong et al., 2019).

3.0 Methodology

This study used a cross-sectional method of patients admitted to various adult wards at Hospital Al-Sultan Abdullah (HASA) in Selangor, Malaysia. The research spans the months of February and July 2022. The data were obtained with prior consent from the patients themselves. It was collected using a structured questionnaire of two parts: Section A (sociodemographic characteristics), and Section B (Factors Affecting Food Intake Questionnaire) administered to the ward participants. The data in Section A include gender, birth date, race, chronic diseases, accidental weight loss, oral nutritional supplements, emergency surgical technique, hospitalization period, and ward classification. The validated questionnaire in Section B is divided into two parts, including dietary questions, and factors affecting food consumption, and the participants will be questioned about their acceptance of hospital foods on a variety of factors, including presentation, smell, taste, texture, portion size, hygiene, temperature, and time (Saiful Hakim, 2022). Anthropometric measurements were collected using a measuring tape with standard techniques to measure the participants' ulnar length and mid-arm circumference (MAC). First, the weight estimation of participants in kilogram was determined using the simplified method of MAC-based weight estimation [weight in kg= (4 × MAC) – 50] (Cattermole et al., 2017). Then, the estimated height was determined based on the ulnar conversion chart. Following that BMI was calculated. Finally, a nutritional risk assessment tool was undertaken to identify patients who may be malnourished (Reber et al., 2019). The Nutritional Risk Screening (NRS-2002) is a precise and well-validated tool for patients aged 18 to 90 who have or are at risk of malnutrition. It includes pre-screening questions on body mass index (BMI), weight loss, food intake, and severity of underlying illness (Reber et al., 2019; Chen et al., 2021). The NRS-2002 score is a numeric value between 0 and 7, with a score of three indicating that a patient is "at nutritional risk" (Chen et al., 2021).

Patients aged between 18 to 60 years old who were admitted to medical wards for at least one night were recruited as the participants. Patients admitted to paediatrics, psychiatric, or acute care units, and obstetric & gynaecology wards were excluded from the research. Patients with critical illnesses who cannot eat by mouth, on a ventilator, on trial diets, receiving parenteral or enteral nutrition, or fasting for an operation or examination procedure will be disqualified from the study. Krecjie & Morgan's (1970) method, with a 95% confidence level and a 5% margin of error, was used to calculate the minimum sample size of 140 participants, including 10% of dropout rate consideration. A purposive sampling method was employed, and 160 participants responded to this study. An Independent t-test was used to dictate the significant difference in mean value between male and female participants for BMI, and risk of malnutrition score. The Pearson Correlation Coefficient test was used to identify the association between BMI and risk of malnutrition score. Finally, descriptive analysis was used to describe factors affecting food intake among participants. This study obtained ethical clearance from the Research Ethics Committee (REC) Universiti Teknologi MARA with reference number REC/11/2021 (UG/MR/905).

4.0 Findings

4.1 Demographic characteristics of participants

Table 1 shows the demographic background of the participants involved in this study. One hundred sixty participants fulfilled the selection criteria and were recruited and completed for data analysis. Most were male (55.0%), with an average male age of 49.2 ± 15.8 and female was 46.1 ± 15.2 years old. In addition, the average length of hospital stay was 3.9 ± 2.8 days.

Table 1. Demographic characteristics of the respondents (n=160)

Variables	Male Percentage (n)	Female Percentage (n)	Total Percentage (n)
Gender	55.0 (88)	45.0 (72)	100.0 (160)
Race			
Malay	93.2 (82)	98.6 (71)	95.6 (153)
Indian	6.8 (6)	-	3.8 (6)
Chinese	-	1.4 (1)	0.6 (1)
Ward discipline			
Medical	85.2 (75)	81.9 (59)	83.8 (134)
Surgical	10.2 (9)	12.5 (9)	11.2 (18)
Orthopaedic	4.6 (4)	5.6 (4)	5.0 (8)
Had dietitian visit			
No	53.3 (76)	91.7 (66)	88.8 (142)
Yes	66.7 (12)	8.3 (6)	11.2 (18)

4.2 Nutritional status

Table 2. Anthropometric measurements of the respondents

Variables	Male (Mean ± SD)	Female (Mean ± SD)	Total (Mean ± SD)	p-value	Percentage
Estimated height, m	1.74 ± 0.07	1.65 ± 0.05	1.70 ± 0.08		
Estimated weight, kg	74.07 ± 21.37	70.02 ± 23.14	73.18 ± 22.44		
BMI, kgm^{-2}	25.90 ± 7.58	24.55 ± 8.62	25.31 ± 8.15	0.16[a]	
BMI category	Male, n	Female, n	Total, n		
Underweight (< 18.5 kgm^{-2})	11	15	26		16.2
Normal (18.5 – 24.9 kgm^{-2})	33	31	64		40.0
Overweight (25.0 – 29.9 kgm^{-2})	17	10	27		16.9
Obesity Class I (30.0 – 34.9 kgm^{-2})	18	7	25		15.6
Obesity Class II (35.0 – 39.9 kgm^{-2})	7	4	11		6.9
Obesity Class III (>40.0 kgm^{-2})	2	5	7		4.4
Malnutrition risk, NRS-2002 score					
No risk (0)	61	52	113		70.6
Low risk (1-2)	19	18	37		23.1
At risk (3-4)	6	2	8		5.0
High risk (>5)	2	0	2		1.3

[a]Independent t-test, statistically significant at p<0.05

The nutritional status of the participants is displayed in Table 2, which includes the weight status and malnutrition risk. The mean body mass index (BMI) was higher in males than females. However, it was not statistically significant. It was found that most participants were classified as either overweight or obese (43.0%). While 40.0% of them were in the normal BMI category, and 16.2% of them were underweight. Most participants (70.6%) had no risk of malnutrition, while 23.1% had a low risk, and 6.3% were at risk of getting malnourish. Further investigation was carried out to determine the association between BMI status and risk of malnutrition score. There was no significant association between both parameters, as shown in Table 3.

Table 3. Association of risk of malnutrition to weight status

Variable	BMI classification, n (%)						p-value
	Underweight	Normal	Overweight	Obese Class I	Obese Class II	Obese Class III	
Malnutrition risk, % (n)							
No risk	15 (13.3)	46 (40.7)	19 (16.8)	18 (15.9)	10 (8.9)	5 (4.4)	
Low risk	9 (24.3)	15 (40.4)	6 (16.1)	5 (13.5)	0 (0.0)	2 (5.4)	0.142[a] (0.117)
At risk	1 (12.5)	3 (37.5)	2 (25.0)	1 (12.5)	1 (12.5)	0 (0.0)	
High risk	1 (50.0)	0 (0.0)	0 (0.0)	1 (50.0)	0 (0.0)	0 (0.0)	

[a]Pearson Correlation Coefficient

4.3 Factors affecting food intake

Table 4. Factors affecting food intake

Factors	Frequency, n (%)	
	Agree	Disagree
Organisational		
Missed meal (hospital procedure/examination/surgery/test)	21 (13.1)	139 (86.9)
Eating environment was not appealing	7 (4.4)	153 (95.6)
Not allowed to eat	7 (4.4)	153 (95.6)
Satisfaction with food		
Food tasted differently	78 (48.8)	82 (51.2)
Did not like the taste of the food	50.0 (31.3)	110.0 (68.8)
The food was too cold	46.0 (28.7)	114.0 (71.3)
Effects Of Illness on Food Intake		
Do not have the usual appetite	61 (38.1)	99 (61.9)
Early satiety	56 (35.0)	104 (65.0)
Do not feel like eating	44 (27.5)	116 (72.5)
Choices		
Normally eat less than food served	65 (40.6)	95 (59.4)
Not hungry at the time served	35 (21.9)	125 (78.1)
Do not like the food offered	27 (16.9)	133 (83.1)
Eating difficulties		
Uncomfortable eating position	23 (14.4)	137 (85.6)
Too weak to (reach/cut up/unwrap/open package) of food	20 (12.5)	140 (87.5)
Chewing/swallowing problem	17 (10.6)	143 (89.4)

Table 4 shows the most common obstacles (more than 30% agreement) that affected the participants' food intake. They responded that 'food tasting differently' (48.8%), 'normally eat less than food served' (40.6%), and 'do not have the usual appetite' (38.1%) as factors that are most likely to affect food intake. The meal organisation by the food service provider and eating difficulty were the least affected factors.

5.0 Discussion

5.1 Nutritional status

70 out of 160 participants were classified as overweight and obese (classes I, II, and III), where the distribution was higher among men than women. This finding was higher compared to a local study where the prevalence of obesity among adults in Selangor, Malaysia, was 18.6%, with more females being fat (Mohd-Sidik et al., 2021). Furthermore, the National Health and Morbidity Survey (NHMS) findings indicated that the prevalence of obesity among Malaysian adults in Selangor was 18.7% (Institute of Public Health, 2020). Moreover, the prevalence of underweight was also higher (16.2%) among the participants in this study compared to the national prevalence which is 6.5% (Institute of Public Health, 2020).

From the assessment of malnutrition risk, most participants (70.6%) had no risk of malnutrition, while 29.4% had a low and were at risk of getting malnourish. If dietary and food consumption issues are not addressed among hospitalised patients, malnutrition will occur, as indicated by a study where 34.7% of elderly patients were malnourished (Tan et al., 2016). In a previous study, malnutrition was reported to be approximately 25% to 40% among hospitalised adult patients worldwide, and most malnourished patients do not undergo any nutrition intervention during hospital admission (Tah et al., 2020).

5.2 Factors affecting food intake

Barriers that impair food intake can be categorised into several groups: organisational, quality/satisfaction with food, effects of illness on food intake, choice, and eating difficulties. Keller et al. (2015) stated that illness effects, eating difficulties, and organisational factors were the most common problem found in their findings. However, the finding from this study showed in this organisational factor analysis that missed meals due to hospital procedures accounted for 13.1%. Dickinson et al. (2008) stated that better care processes, including nursing practice, could improve organisational barriers. For example, nurses can monitor when a meal is missed and instantly deliver a replacement meal to the patients.

Nearly 48.8% of participants agree that the food tastes different, making it the most significant barrier regarding quality/satisfaction with food. Followed by 31.3% of them who did not like the taste of the food and 28.7% complained that the food was too cold when served. The result correlates with another local report about patient satisfaction with hospital food service where patients gave the lowest range scores of satisfaction to questions such as 'the meals taste good', 'I like the way the vegetables were cooked' and 'the hospital food was good as expected' (Aminuddin et al., 2018). Hence, this proves that patient satisfaction with food quality was affected by the food taste, flavours, and how the meat and vegetables were cooked (Aminuddin et al., 2018). Furthermore, another study found that temperature significantly impacts food quality, followed by flavour (Chemah et al., 2018).

Parameters linked to food consumption during hospitalisation are associated with the condition of hospitalised patients and the quality of hospital food (Osman et al., 2021). Symptoms of nutritional effects include stomach distention, dysphagia, diarrhoea, nausea, vomiting, lethargy, low appetite, being too ill or too exhausted to eat, and poor dentition. (Osman et al., 2021). The most common illness factors on food intake in this study were the patients did not have a usual appetite, comprised 38.1% and did not feel like eating 27.5%. Low appetite or lack of hunger due to clinical condition is the most prevalent reason for reduced food intake during hospitalisation and an independent predictor of length of hospital stay (Kontogianni et al., 2020). Lack of appetite can be multifactorial and partly attributed to the underlying disease-related anorexia, psychological issues, and aging and may be enhanced by medications' side effects and the hospital environment during hospitalisation (Kontogianni et al., 2020). Treatment with an appetite stimulant may boost appetite. However, it may worsen early satiety since the increased food intake from the appetite stimulant competes with the body's inability to metabolise the food taken (Davis et al., 2006).

The addition of this part to this study indicated that 35.0% of respondents having symptoms of early satiety. Early satiety is the desire to eat, followed by the inability to consume owing to a feeling of fullness. Anorexia is one of the most prevalent and significant symptoms of advanced cancer. The degree of anorexia can be measured by the symptom of early satiety, which restricts nutritional intake (Davis et al., 2006). Due to gastrointestinal symptoms, including anorexia, dry mouth, constipation, early satiety, nausea, taste change, vomiting, and dysphagia, patients with gastrointestinal disorders were more likely to consume either a quarter or nothing of the offered meal (Kontogianni et al., 2020; Komurcu et al., 2002). Specific dietary approaches can help lessen the symptom of early satiety, such as frequent little meals, increased dietary fat intake to lower intra-meal satiety, and colder food temperatures to assist the reduced food aversion. No single change alone is likely to be sufficient to solve the symptom. However, drug treatment such as megestrol acetate with ghrelin, or with cannabinoids may improve the taste and the appetite (Davis et al., 2006).

6.0 Conclusion& Recommendations

The present study demonstrated a low prevalence of malnutrition in this setting. In addition, quality/satisfaction with food was found to be the most common barrier in food intake among hospitalised patients. Hence, hospital food service should address these issues by

providing tasty, flavourful meals but also nutritious. Other common factors that should be noted were the choice or food preference and the effects of illness on the food intake.

Further research should widen the research setting by employing many inpatients from different hospitals with different management throughout Malaysia. However, this study included both elderly and young patients with a wide range of medical conditions. Furthermore, patients who could provide informed consent and were healthy enough to be interviewed were the only ones recruited. Therefore, patients who were too unwell to participate or unable to provide informed permission may have extra food access issues.

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Paper Contribution to Related Field of Study

This study provides additional data on the prevalence of nutritional status, risk of malnutrition, and the factors affecting food intake among hospitalised patients. It could help food service operators, hospital administrators, health-related agencies, government ministries, and other stakeholders to develop and provide better hospital food service to improve patients' behaviour towards lifestyle.

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