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BMI and Nutritional Profile in Patients with Chronic/ Acute Wounds in a Tertiary Hospital

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Abstract

Adequate nutrition is important to overcome stress-induced metabolic responses and assist with immune-modulation. Interestingly, the prevalence of nutrition deficiency is higher in the obese population when compared with normal weight population [1]. Studies have shown an increased risk of complications in obese hospitalized patients secondary to inappropriate nutritional support [2,3,8].

Screening tools such as: weight, body mass index, mid-upper arm circumference, percentage of weight loss in 3 months when applied to obese patients are likely to show an acceptable nutritional status in these patients [3,8].

The aim of our observation study is to identify patients with wounds in a tertiary hospital, their Body Mass Index (BMI) and its association with type of wound and their albumin/ pre-albumin levels.Amongst the 533 wound consults between December 2014 and November 2015, a total of 107 met the criteria with BMI, albumin and pre-albumin levels available by the time of consultation.

The vast majority of our patient populations wereCaucasians (97.25%) with average age of 60 years. The most prevalent wounds were pressure ulcers (62%).

Our data suggests that patients with elevated BMI and wounds are at risk for malnutrition as measured by pre-albumin and albumin levels. Despite anaverage BMI of 31.5, our nutritional parameters showed moderate malnutrition with pre-albumin levels of 11 and albumin levels 2.1.

The conclusion is that the nutritional screening tools for identification of malnutrition in obese patients should be at minimal individualized. Current screening tools such as BMI, anthropometric values may fail to identify malnutrition in that patient population. Furthermore with increasingly obese population, and evidence showing higher morbidity in obese patients, it is pivotal to improve nutritional screening to better address this population [5,6].

Introduction

Appropriate nutrition intake in patients with chronic and/or acute wounds is a fundamental aspect of care. Nutrition plays a significant role in overcoming stress-induced metabolic responses, preventing oxidative cell injury and assisting in modulation of immune response.

Malnutrition leads to impaired immune function with resultant increase in infectious complications, loss of protein through gluconeogenesis resulting in weakened of muscles such as respiratorythat will reduce the ventilator drive leading to higher incidence of pneumonia and lastly delayed of wound healing [1]. Nutritional support reduces catabolism decreasing complication rates and hospital length of stay [2,3].

Current nutritional supplementation guidelines recommend 25-30Kcal (kilocalories) x Kg (kilograms) x day with 1.2 to 2 grams of protein x Kg x day. Although there is a consensus that excessive hypo caloric (less or equal 25% recommended daily caloric intake) or hyper caloric (more or equal 125%) should be avoided, there is no consensus on feeding targets [1].

Nutritional unbalance can be found not only on normal weight patients but also at the obese population. Interestingly, the prevalence of nutrition deficiency is higher in the overweight, obese and morbidly obese population when compared with normal weight population. This suggests that obese patients may consume more energy diets without meeting their essential nutrient needs. Furthermore, the absorption, metabolism and distribution of these nutrients may be altered in overweight, obese and morbid obese patients [2].

Other factors also play a role in impairment of wound healing in obese patients. Obesity can lead to stress, anxiety, depression that can impair immune response. The adipose tissue secretes a variety of bioactive substances named adipokines.

Adipokines have a significant impact on immune and inflammatory response. Its negative influence leads to decreased mononuclear cell function, lymphocyte proliferation and altered peripheral cytokine levels. The inability to identify patients that have malnutrition and/or those that may be nutritionally at risk is one of the causes of increase morbidity during hospital stay associated with delayed recovery after discharge. With the increase in incidence of obesity in the general population most likely there will be an increase in incidence of hospital admissions of obese patients. Studies have shown an increased risk of complications in obese hospitalized patients secondary to inappropriate nutritional support [2,3,8].

Screening tools such as: height/ weight, body mass index, mid-upper arm circumference, recent energy intake, percentage of weight loss in 3 months when applied to obese patients are likely to show that these patients have an acceptable nutritional status[3,8]. Obese patients will have a BMI > 30kg/m2 and arm muscle circumference and triceps skin fold measurements >75th percentile [4,7]. Based on these parameters, obese patients will be screened as low or minimal risk for malnutrition. The aim of our study is to identify patients with acute/ chronic wounds in a Tertiary hospital, their BMI and its association with type of wound and their albumin(alb) x pre-albumin(PAB) levels.

Methods

Study design: An observational study was conducted from December 2014 to November 2015 in all wound consults at a rural tertiary care hospital. The Institutional Review Board for Human Subjects Research at the West Virginia University approved the study assuring that its design was in agreement with the Declaration of Helsinki and Ethical treatment of human subjects.

Patients: We observed all patients that the inpatient wound team was consulted and followed for evaluation of wounds acute and chronic.

Inclusion criteria was: older or equal 18years old, projected hospital stay more than 36hr as judged by the admitting team, BMI, albumin and pre albumin levelsavailable in the chart by the time of consultation.

Exclusion criterial was: patients were younger than 18 years of age, patients who had expected death or hospital discharge within 36hr, pregnancy.We collected data on diagnosis of admission, type of wound (acute, chronic, venous insufficiency, diabetic foot ulcer, pressure ulcer, arterial insufficiency and surgical wound), patient's age, BMI, albumin levels, pre albumin levels by the time of consultation.

Results

Our observational study was based on 533 patients that the inpatient wound team was consulted between December 2014 and November 2015, with a total of 107 patients that met the criteria with BMI, albumin and pre albumin levels available in the chart by the time of consultation.

The vast majority of our patient population were Caucasians with only 3 (2.75%) being other races and an average age 60.1 years old (min 21 years old and maximum of 95 years old). The most common cause of wound consult was pressure ulcers with others responsible for 41 consults (38%)(Figure 1 and 3).

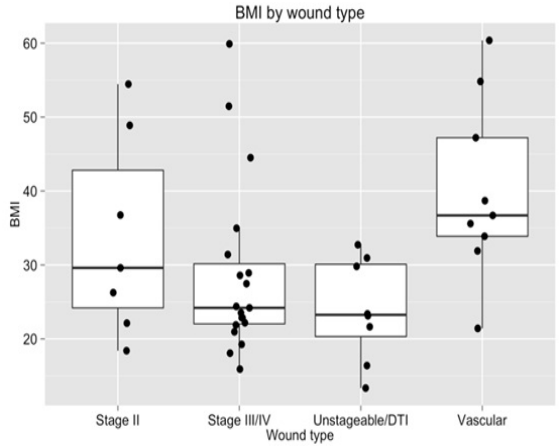

Figure1: Figure shows box plots of BMI distribution over different types of wound. Horizontal bar shows the media in each group and the boxes span between the 25th and 75th percentile. Individual data points are overlaid.

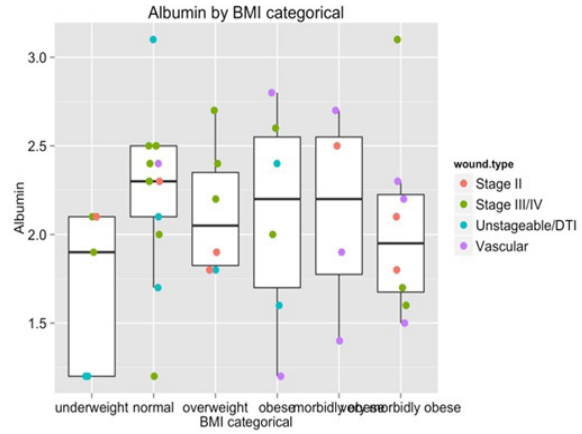

Figure 3: Figure shows box plots of albumin distribution over differentBMI strata. Horizontal bar shows the media in each group (albumin levels) and the boxes span between the 25th and 75th percentile. Individual data points are overlaid.

Shows box plots of BMI distribution over different types of wound. Patients with larger wounds such as stage III and IV pressure injuries have a lower BMI in relation to the studied population.As expected based on the characteristics of our patient population, the average BMI was 31.57 with a minimum of 13.35 and maximum of 84.84.

The albumin levels at the time of consultation were on average of 2.17mg/dl (min 1 and max 3.7) and the pre-albumin levels at the time of consultation were on average 11.66mg/dL (min 3.2 and max 28.3). In our Institution we consider normal nutrition albumin levels above 3.0mg/dl and pre-albumin levels above 20mg/dl. Figure 2 and 4 show a scatter plot between albumin levels and BMI (figure 2) and pre-albumin levels and BMI (figure 4).

A trend line is plotted in figure 2 and it shows a lower albumin level in all obese patients studied similarly a trend line plotted in figure 4 shows a lower pre-albumin level in all obese patients.

In the pre-albumin trend line there is a decrease of pre-albumin levels to severe malnutrition as the BMI increases which corroborates without hypothesis that obese patients with wounds have increasingly nutritional deficiencies.

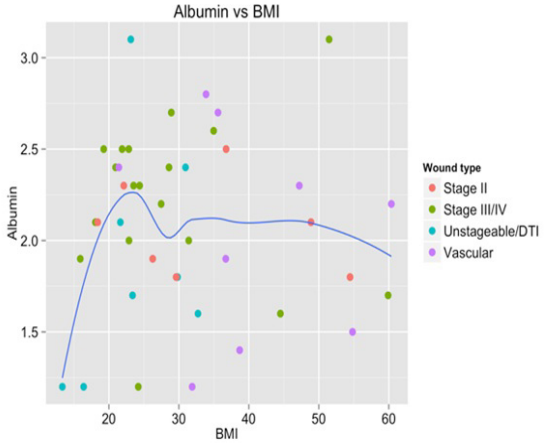

Figure 2: Figure shows a scatter plot between albumin levels and BMI. A trend line is plotted and it shows a lower albumin level in all obese patients studied.

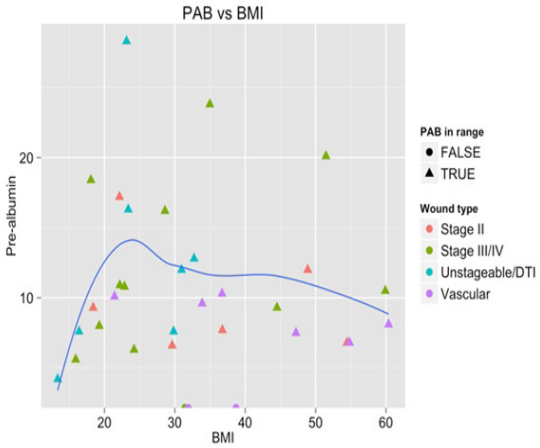

Figure 4: Figure shows a scatter plot between pre-albumin levels and BMI. A trend line is plotted and it shows a lower pre-albumin level in all obese patients studied.

When correlating BMI and levels of album in and pre-albumin, our data suggestions that patients with an elevated BMI and wounds are at risk for malnutrition as measured by pre-albumin and albumin levels at the time of consultation.

Discussion

Obesity alone is linked to increased morbidity and mortality with overweight patients at higher risk of development of cardio-

vascular and respiratory diseases. Obese patients with wounds offer specific challenges to care: increase body weight and adiposity, respiratory problems, de-conditioning [8].

A careful consideration of nutritional status is important in all patients with acute/ chronic wounds. Significant nutritional deficits in patients with wounds can develop quickly. Therefore, it is paramount that clinicians initiate preventive measures immediately after admission to the hospital.

This study suggests that the nutritional screening tools for identification of undernutrition or patients with malnutrition should be at minimal individualized. Current screening tools such as BMI, anthropometric values may fail to identify under/ malnutrition in obese patients - does one size fit all? Moreoverwith increasingly obese population, especially in rural areas, increasingly evidence showing higher morbidity in obese patients with wounds, it is pivotal to improve nutritional screening and tools for assessing nutritional status in these populations.

Areas of future research should assist in improve screening tools, determine the true prevalence of malnutrition and prevention of nutritional deficiencies in obese population. Additionally, there is a need of development of appropriate recommendations for nutrition and wound healing in obese patients associated with a follow up plan.

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