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Review Article

PATIENT-GENERATED SUBJECTIVE GLOBAL ASSESSMENT (PG-SGA): A REVIEW

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ABSTRACT

The present investigation, Subjective Global Assessment (SGA) and its different variants are being widely used as a nutritional status or risk assessment tool in clinical and hospital practice for myriads of disease including life-threatening one such as cancer, chronic kidney diseases. SGA is based on measurement and observation of several parameters such as weight change, dietary intake change, gastrointestinal symptoms, functional capacity, co morbidities related to nutritional condition and physical examination. However, the tool is not devoid of limitation and is being constantly improved for the optimization of its use in various other diseases. Therefore, clinicians need an easy to use and interpret, low cost, reliable tool to assess nutritional status. The PG-SGA is a more sensitive tool than other versions of SGA and is successfully being used as a screening tool in diseases like cancer, tuberculosis, HIV and chronic kidney disease (CKD) etc. According to the theory of "reverse epidemiology", a patient with better nutritional status is supposed to have increased scope of survival. Therefore, it is increasingly being used patients who are at the pre-dialysis stage or being treated with dialysis. The review will summarize the basics of the nutritional assessment tool, its indications, and limitation of use in clinical practice etc. Moreover, the review will summarize the recommendations for use of PG-SGA in CKD and a brief review of existing literature to understand the scope of use and future perspective of the application of this tool for using in CKD patient population.

Key Words: SGA, PG-SGA, Chronic kidney disease, Dialysis, nutrition

INTRODUCTION

SGA (Subjective Global Assessment) is a nutritional assessment tool, is used for the prediction of nutritional status in patients with various ailments. This tool is more informative in assessing the chances of postoperative infections and mortality after surgery[1]. In the past, the risk of mortality after surgery and nutritional assessment has been estimated mainly based on Body Mass Index (BMI), and some other factors such as serum proteins, weight, or the percentage change in food intake.

National Kidney Foundation (NKF) has recommended this technique to be used in predicting Kidney Disease or Dialysis outcomes and Quality Initiative (K/DOQI) in adult patients undergoing dialysis. In 2004 Steiber AL studied nutritional assessment of patients with chronic kidney disease is a vital function of health care providers. Subjective Global Assessment (SGA) is a tool that uses 5 components of a medical history (weight change, dietary intake, gastrointestinal symptoms, functional capacity, disease and its relation to nutritional requirements) and 3 components of a brief physical examination (signs of fat and muscle wasting, nutrition-associated alternations in fluid balance) to assess nutritional status[1].

A brief history of SGA

Scientists have shown that malnutrition adversely affects the health condition in individuals. This understanding of nutritional status was furthered strengthen in 1944 Cannon reported that the protein deficiency increases the risk of infection in post-operative patients[2, 3].

Another path-breaking report that riveted the medical community on the same subject was submitted in 1974 Charles E. Butterworth Jr studied that the hospitalized patients often suffer from malnutrition, he has called this phenomenon as "skeleton in the closet,"[4]. Other studies have also reported that 50% of the surgical patients suffer from malnutrition extending their hospital stay and in worst cases leading to mortality. The more disturbing fact that came out through these researches is that among 75% of the patients acquired that malnutrition after they were hospitalized[5]. All these findings had initiated a search for a bedside nutrition assessment tool that can successfully identify malnutrition in hospitalized patients.

The first report on came on the Subjective Global Assessment (SGA) in 1982 Baker reported that an integrated system that utilizes the clinical judgment of a practitioner and by doing so can identify patients at risk of or with malnutrition[6]. Similar experiment in 1987 Detsky, reported the complete SGA protocol that uses the clinical judgment to evaluate the nutritional status of preoperative surgical patients and predict the chances of infection in them after surgery[7]. This protocol had 5 components that depend on the medical history of the patients including weight change, dietary intake, gastrointestinal symptoms, functional capacity, disease and its relation to nutritional requirements.

In 1999 Stenvinkel was published another version of the SGA where the original scoring of A, B, C scale was changed to a 4-point scale using 1 as normal nutritional status and 4 as severe malnutrition[8]. In 1994 Ottery has developed the Patient Generated (PG)-SGA, which was created for the nutrition assessment of patients with cancer. In addition to the original format, this protocol includes additional questions regarding the presence of nutritional symptoms and short-term weight loss[9]. This scored PG-SGA is further modified and a numerical scoring system was introduced that provides a global rating to the patients as well-nourished, moderately malnourished or suspected malnourished or severely malnourished[10].

Indications and advantages

SGA is a well-validated tool based on an assessment of patient's medical history such as alterations in weight, dietary habits and functional capacity, GI malfunction symptoms with the nutritional pattern, and metabolic stress of the disease presently being suffered by the patient. In addition to this, a brief physical examination to identify loss of muscle wasting and ankle or sacral edema, subcutaneous fat is performed. Based on which patients are categorized into well nourished (Cat. A), sub optimally nourished or at a risk of malnutrition (Cat. B) and malnourished (Cat. C) [11].

The combination of the new functional method with the outcome of SGA can validate the significance of early nutritional intervention as functional capacity is restored well before the body composition changes[12]. It is a well-accepted gold standard method for screening nutritional risk in end-stage renal disease patients. Moreover, in geriatric patients or critically ill patients where biochemical and anthropometric parameters are impossible or difficult to measure, SGA can be an effective tool for the evaluation of nutritional parameters[13]. SGA is also being widely used as a tool for prognosis in several clinical setting including cancer, CKD and surgery. Several studies have established a good correlation between the finding from SGA and the mortality and morbidity for the disease[14].

Limitations of SGA

The limitations of the method are that the tool highly depends on the observer's experience. It is often found that various non-nutritional factors (eg. Age, other comorbidities) may mask the nutritional factors as assessed by SGA leading to improper evaluation. Therefore, only a multivariate analysis that normalizes these factors can lead to an unambiguous conclusion. Moreover, in critically ill patients, it is a very useful tool in primary screening but has little or no use in the follow-up period[15]. Such methodology for is useful for assessing chronic condition than an acute one. For the evaluation of acute changes in nutritional status, the method needs to be more sensitive than being more specific. The major development in this regard is the advent of patient-generated subjective global assessment where the parameters such as eating habits, disease category, and co-morbidities are included for final scoring by the physician after evaluating response given by the patient. This method can be used during follow-up and at regular interval to assess the nutritional continuum.

The specificity and sensitivity both are higher than SGA and can be used as diagnostic and prognostic nutritional assessment tool. Although initiated for cancer patients, PG-SGA is being extended for several other clinical disorders. However, the limitation of observer dependency remains the same in this method too[16].

SGA and diseases

SGA tool has been refined, used and validated for various research, clinical, and epidemiological purposes worldwide in different diseases.

PG-SGA in cancer

PG-SGA has been successfully used in cancer patients to predict the nutritional status and reduced food intake and an increased energy gap result in the deterioration of nutritional status. PG-SGA has also been used as a tool to identify nutritional status in children recently diagnosed with cancer. Therefore, it is really important to detect malnourishment in a patient during the preoperative and postoperative follow up cases. The various modified forms of this technique have also been used to predict the prognosis of survival in oncology patients. In gastric cancer patients, this tool was successfully used to predict the nutritional status after gastrectomy[17].

Another modified version of PG-SGA called an abridged version of the PG-SGA (abPG-SGA), was used and validated by in 2013 Gabrielson was reported that the 94% sensitivity and 78% specificity for abPG-SGA, which was slightly lower than the PG-SGA. However, the specificity and sensitivity of this technique were higher than that of MST. In these study 90 oncology patients who were receiving chemotherapy was accessed using SGA global rating scale, PG-SGA and malnutrition screening tool (MST). The authors have thus concluded that abPG-SGA can be used as a valid tool to predict the malnutrition in oncology patients[18].

The study has used various anthropometric measurements and PG-SGA in pediatric cancer patients to access prevalence of malnutrition among them. The result indicates that PG-SGA is a valid tool that can access the nutritional status of hospitalized children with cancer. However, no correlation was reported between this assessment tool with growth retardation or weight of the children[19].

PG-SGA in HIV

HIV infected patients malnutrition is a very common problem, SGA can effectively detect malnutrition in HIV infected patients. The effect of the infection on the nutritional status of the patient starts early even before the individual is started manifesting the symptoms of the infection or has been detected with AIDS. Compared to other nutritional assessment techniques SGA was more reliable in detecting worsening of nutritional status and thereby it is more helpful in prescribing artificial nutrition to malnourished patients[20]. In 2011 Mokori studied that PG-SGA has only 69.2% sensitivity and 57.1% specificity in categorizing the risk for malnutrition in HIV infected patients. Moreover, they have found no significant correlation of this tool with the nutritional status of the population[21].

In another study, the patient-generated subjective global assessment (PG-SGA) was used in patients with acute leukemia. Further, this study has also studied the effect of nutritional status on prognosis. This study has shown that PG-SGA is an effective tool in the evaluation of nutritional status in acute leukemia patients[22].

PG-SGA in Tuberculosis

There is a strong correlation between infection and nutritional status. Recurrent infections lead to a depletion of body nitrogen and deteriorate nutrition status. The malnutrition, in turn, produces a higher susceptibility to infection. In 2011 Miyata used this nutritional assessment tool in patients with pulmonary tuberculosis and observed that other than being a useful nutritional assessment tool SGA can be used as a prognostic indicator of survival in these patients[23].

PG-SGA in chronic kidney disease

Chronic kidney diseases comprise of different pathophysiological conditions associated with abnormal kidney function and a progressive decrease in glomerular filtration rate (GFR). In most of the patients, chronic kidney failure is associated with a condition called as protein-energy wasting (PEW) or protein-energy deficit (PED). This particular condition is more commonly found in patients undergoing maintenance dialysis. In most of the cases, the CKD patients die because of the short-term consequences of malnutrition[24]. As proposed by The International Society of Renal Nutrition and Metabolism or ISRNM the

diagnostic criteria for protein-energy wasting among CKD patients can be divided into 4 categories as follows : 1. Biochemical indicators, 2. Weight loss, reduced body fat content or low body weight 3. Loss of muscle mass and 4. Decreased protein intake. Among biochemical parameters, serum albumin and C - reactive protein have been shown to be a significant predictor of mortality in hemodialysis patients[25, 26].

However, biochemical parameters seem to be less accurate compared to the other sign and symptoms of the PEW. In addition, studies have also shown that improving nutritional status by providing dietary and non-dietary interventions also improves the outcome in CKD patients[27]. Therefore, in CKD patients' nutritional assessment proves to be of primordial importance. The first validation of SGA protocol was done in 1993 Enia reported that hemodialysis and peritoneal dialysis patients. The results of this study indicate that in dialysis patients there exist a strong correlation between the SGA scoring and values for serum albumin, percent of body fat, arm muscle circumference and protein catabolic rate[28].

This modified SGA-7 point scale is recommended as the valid method to identify patients with protein-energy malnutrition by the American guide of approaches in nephrology, National Kidney Foundation or Dialysis Outcome Quality Initiative and by the European Best Practice Guidelines on Nutrition (EBPG)[24]. Several authors have studied the nutritional status of renal disease patients using different modified versions of SGA. In these studies, the samples size ranged from 41 to 7,719 patients and the rating scale also changed from 7 points to 49 or 57 points. The data collection methods also varied from prospective to retrospective[7,29,30] .

In 2002 Pifer have used a modified subjective global assessment (mSGA) tool along with various other biochemical parameters such as serum albumin, serum creating to predict the mortality rate among the hemodialysis patients enrolled in the international Dialysis Outcomes and Practice Patterns Study (DOPPS). The result of this study indicates that mSGA, serum albumin, serum creatinine, BMI, and lymphocyte count were independently associated with significantly higher risk of mortality in patients undergoing hemodialysis [30].

NECOSAD-II evaluated the long-term and time-dependent associations of the 7 point SGA and its subscales with mortality among chronic dialysis patients in a multicentre cohort study. The result of this study indicates that protein-energy malnutrition as assessed by SGA is associated with a 2-fold increase in the mortality risk also showed that in a time-dependent manner this association becomes stronger[31]. In a study conducted in six European countries, it was reported that among older patients (aged >65 years) with an advanced stage of kidney disease the prevalence of PEW is quite high as assessed by the 7-point SGA rating. Loss of fat tissue and muscle wasting was more common in patients aged more than 80 years[32]. Similarly reported in 2017 Campbell studied that SGA can effectively predict the risk of mortality among dialysis and non-dialysis CKD patients [33].

In 2001 Kalantar studied serum albumin level was lower in SGA malnourished patients receiving continuous ambulatory dialysis[34]. In contrast to this finding in 1997 Jones have found no significant difference in serum albumin level among the normal and malnourished group[35]. These inconsistencies of SGA with serum albumin level have raised doubts about the validity of the SGA in CKD patients. To overcome this difficulty scientist have recommended including several biochemical markers along with the SGA rating to predict the presence of malnutrition in CKD patients[1]. In spite of all these advantages of SGA in finding malnutrition in CKD, patients controversy appears that whether SGA can significantly correlate with the serum albumin level, which is the most commonly used malnutrition indicator used in CKD patients.

CONCLUSION

In this context, studies have shown utility in the assessment of nutritional risk in hemodialysis patients. However, it cannot be used as a gold standard in CKD patients unless verified by a large, multicenter trial with required parameters to be able to prevent type I and II errors. Similarly, it is useful to decide which format of SGA is most effective for a morbid disease like CKD. To address all these issues, more studies and multivariate analysis are warranted in this context to evaluate the impact of scored patient-generated SGA in various other clinical settings. The method of assessment has gone through several evolutionary stages including the advent of patient-generated subjective global assessment (PG-SGA). Initially applied to cancer patients, PG-SGA has drawn much attraction for nutritional risk assessment in several other disease conditions. In addition, SGA is being increasingly used to validate newer methods of nutritional screening such as Malnutrition Universal Screening Tool (MUST), Nutritional Risk Screening (NRS 2002) and Mini Nutritional Assessment (MNA).

However, due to its inability to detect acute changes in nutritional status, the findings may always not in agreement with the new methods. Scored patient-generated SGA is now being extensively used in severe morbid diseases such as chronic kidney disease.

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