IJBCS
ISSN: 2147-1428

Review

International Journal of Basic and Clinical Studies (IJBCS)
2013;1(1): 1-16. Celik F

Malnutrition through the World

Fatma Celik*

*Doc.Dr.,PhD.,Dicle University, Medical Faculty, Department of Public Health, Specialist in Nutrition, Diyarbakir, Turkey

Abstract

Malnutrition represents a huge burden on health costs around the world, especially in some areas of Asia and Africa. The prevalence of acute malnutrition over the last 10 years in hospitalized children in Germany, France, the UK and the USA varied between 6.1 and 14%, whereas in Turkey up to 32% of patients with malnutrition were reported. Malnutrition may consequently lead to decreased quality of life; delayed wound healing; fatigue and weakness; increased mortality, length of hospital stay, risk of infection and other complications, rate of GP visits, prescription rates, hospital admissions and need for nursing home admission or home healthcare; and lower rates of return to independent living.

Anorexia, defined as the loss of the desire to eat, is common in cancer patients. Cachexia is a complex metabolic syndrome. It is characterized by loss of muscle with or without loss of fat mass. Anorexia, inflammation, insulin resistance, and increased muscle protein breakdown are frequently associated. Cachexia is distinct from starvation, age-related loss of muscle mass, primary depression, malabsorption and hyperthyroidism and is associated with increased morbidity. However, Sarcopenia is a loss of muscle protein mass and loss of muscle function. It occurs with increasing age, being a major component in the development of frailty.

Professional teams of oncology physicians, nurses, and dietitians, along with patients and families, can diagnose specific needs and plan individualized treatment for improved nutritional health. Counseling, which any member of the health care team may provide, is an effective and inexpensive intervention and should be combined with other nutritional interventions. Effective communication with patients and their families is essential and is an important component of treatment.

Key words: Malnutrition, Anorexia, Cachexia, Sarcopenia, Nutritional

Introduction

The State of Food Insecurity in the World 2012 presents new estimates of the number and proportion of undernourished people going back to 1990, defined in terms of the distribution of dietary energy supply. With almost 870 million people chronically undernourished in 2010–12, the number of hungry people in the world remains unacceptably high. The vast majority live in developing countries, where about 850 million people, or slightly fewer than 15 percent of the population, are estimated to be undernourished (1).

Malnutrition represents a huge burden on health costs around the world, especially in some areas of Asia and Africa. The prevalence of acute malnutrition over the last 10 years in hospitalized children in Germany, France, the UK and the USA varied between 6.1 and 14%, whereas in Turkey up to 32% of patients with malnutrition were reported. In the UK alone it has been demonstrated that malnutrition costs over £7.3 billion per year (10% of public expenditure on health). In Latin America and the Caribbean, it still represents a health concern expressed mainly as stunting and micronutrient deficiencies, lessening the attention given to acute malnutrition (moderate and severe); however, the latter has a high fatality rate. Ending these avoidable deaths represents a major health and ethical challenge in the region. Undernutrition is the most important factors contributing to child morbidity and child mortality in developing countries (2-5).

Malnutrition, with its 2 constituents of protein–energy malnutrition and micronutrient deficiencies, continues to be a major health burden in developing countries. It is globally the most important risk factor for illness and death, with hundreds of millions of pregnant women and young children particularly affected.

Apart from marasmus and kwashiorkor (the 2 forms of protein– energy malnutrition), deficiencies in iron, iodine, vitamin A and zinc are the main manifestations of malnutrition in developing countries. In these communities, a high prevalence of poor diet and infectious disease regularly unites into a vicious circle. Although treatment protocols for severe malnutrition have in recent years become more efficient, most patients (especially in rural areas) have little or no access to formal health services and are never seen in such settings. Interventions to prevent protein– energy malnutrition range from promoting breast-feeding to food supplementation schemes, whereas micronutrient deficiencies would best be addressed through food-based strategies such as dietary diversification through home gardens and small livestock (6,7).

The purpose of this review is to define malnutrition to describe the current prevalence throug the world, the risk groups and to explain how could be treated.

Defining malnutrition

Malnutrition is known to predispose to disease, adversely affect its outcome, and detrimentally affect physical and psychological health. Malnutrition literally implies bad or defective nutrition.

It as a nutritional condition in which insufficient or disproportionate energy, protein, and other nutrients adversely affect tissue/body form (shape, size and composition) and function, and clinical outcomes. It as "a subacute or chronic state of nutrition in which a combination of varying degrees of undernutrition and inflammatory activity have led to a change in body composition and diminished function. Not only in disease-related malnutrition but also in endemic malnutrition, loss of body cell and fat mass almost invariably coincides with inflammatory activity, aggravating each other and thus resulting in a vicious circle. Malnutrition may consequently lead to decreased quality of life; delayed wound healing; fatigue and weakness; increased mortality, length of hospital stay, risk of infection and other complications, rate of GP visits, prescription rates, hospital admissions and need for nursing home admission or home healthcare; and lower rates of return to independent living (8,9).

Protein – energy malnutrition occurs as a result of a relative or absolute deficiency of energy and protein. It maybe primary, due to inadequate food intake, or secondary, as a result of other illness. For most developing nations, primary protein-energy malnutrition remains among the most significant health problems. Protein-energy malnutrition has been described as two destinct syndromes.

Kwashiorkor, caused by a deficiency of protein in the presence of adequate energy, is typically seen in weaning infants at the birth of a sibling in areas where foods contaning protein and energy deficiency, is most commonly seen where adequate quantities of food are not available. In industrialized societies, protein-energy malnutrition is most often secondary to other diseases. Malnutrition and infection are the common association which causes morbidity and mortality. Kwashiorkor-like secodary protein-energy malnutrition occurs

primarily in association with hypermetabolic acute illnesses such as trauma, burns, and sepsis. Marasmus-like secondary protein-energy malnutrition typically results from chronic diseases such as chronic obstructive pulmonary disease (COPD), congestive heart failure, cancer, or AIDS (10,11).

Cachexia and Anorexia :

The term cachexia is derived from the Greek words kakos and hexis, meaning "poor condition." Cachexia is a broad, heterogeneous syndrome. The key feature is muscle wasting that cannot be easily or completely reversed by increased food intake alone or loss of appetite frequently accompanies cachexia. Cachexia is an important feature of many acute and chronic disorders. Cachexia characterizes the clinical course of these conditions and leads to reduced quality of life, increased morbidity, and increased mortality. Cachexia does not have an agreed-upon definition but represents the complex metabolic process that occurs in patients with these conditions. Unlike starvation, in which fat stores alone are depleted initially, cachectic patients lose both skeletal muscle mass and fat. Cancer is the most common cause of cachexia. Cachexia could be considered initially as a defense mechanism that aids recovery from injury and starvation by producing increased amounts of endogenous substrate. When the numerous metabolic alterations in cachexia persist chronically, the detrimental effects outweigh the benefi ts. Cachexia can occur without anorexia, indicating the presence of catabolic mediators produced by tumor or host cells involved in the cancer cachexia process. Catabolic mediators include pro-inflammatory cytokines, tumorspecific factors, and hormones. Figure 1. summarizes the pathophysiology of cachexia (12).

Currently, the most widly known criteria for diagnosing anorexia nervosa (AN) are included in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) and its European counterpart, International Classification of Diseases (ICD-10) (Tables 1 and 2) (13-15).

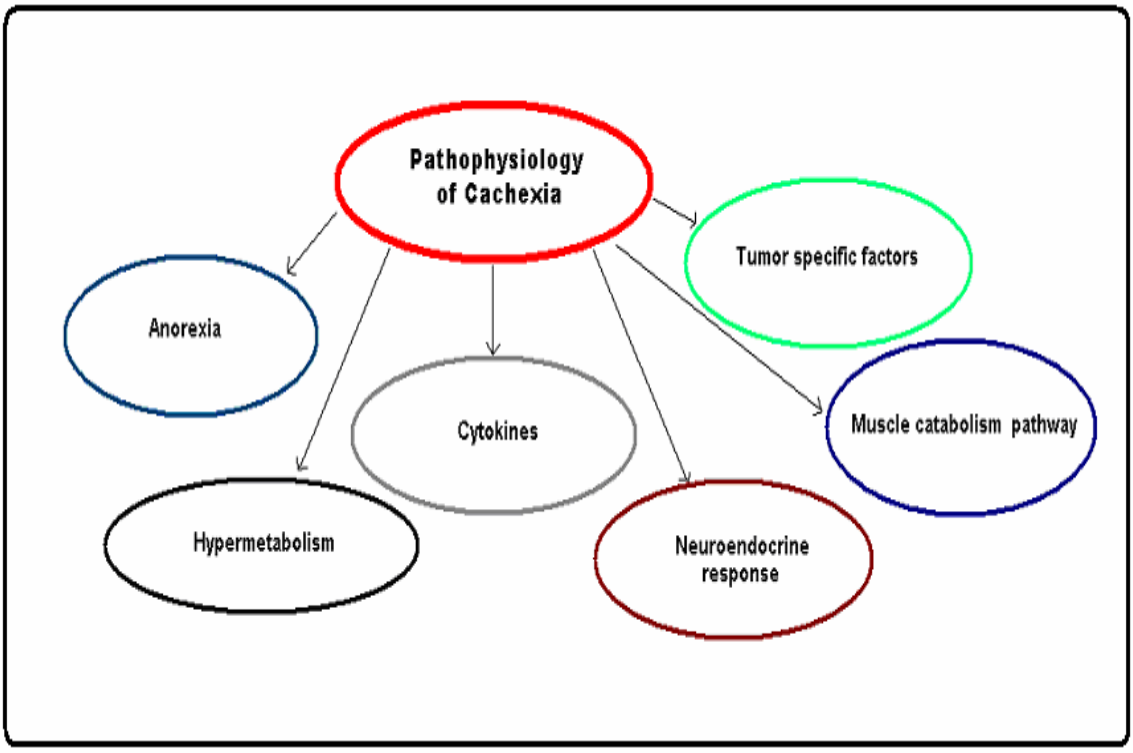

Figure 1. Pathophysiology of cachexia. IFN, interferon; IL, interleukin; TNF, tumor necrosis factor

Table 1. Diagnostic criteria for anorexia nervosa according to DSM-IV

A. Rejection to maintain same body weight or above normal minimum value considering age and size (for example, loss of weight that results in weight <85% of normal or failure to gain weight during development, resulting in a weight <85% of normal)
B. Fear of gaining weight or becoming obese, even being below normal weight
C. Perception alteration of weight or body silhouette, exaggerating their importance in self-evaluation or denial of danger of maintaining a low body weight
D. Amenorrhea in adolescent women; for instance, absence of at least three consecutive menstrual period (a woman presents amenorrhea when menstruations only occur under hormonal treatments such as estrogen administration)

To specify type:

Restrictive type. During anorexia nervosa episode, the patient does not present a binge-purgative behavior (for example, self-induced vomiting or excessive use of laxatives, diuretics or enemas).

Compulsive/purgative type. During anorexia nervosa episode, the patient presents binge-purgative behavior (for example, self-induced vomiting or excessive use of laxatives, diuretics or enemas).

Adapted from: American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, 4th ed. (DSM-IV). Washington, DC: American Psychiatric Press; 1994.

Table 2. IDC 10 and OMS criteria

F50.0 Anorexia nervosa

a) Significant weight loss (body mass index <17.5). Pre-adolescents do not experience weight gain characteristic of growth period.
b) Weight loss is originated by patient through: 1) avoid eating "fattening foods" and one or more of the following symptoms: 2) self-induced vomiting, 3) self-induced bowel emptying, 4) excessive exercise and 5) consumption of laxatives or diuretics.
c) Body image distortion consisting of a specific psychopathology characterized by a persistence fear to obesity or flaccidity, so patients self-impose maintaining a below-normal body weight.
d) Generalized endocrine disorder affecting hypothalamic-pituitary-gonadal axis expressed in females as amenorrhea and in males as a loss of sexual libido and sexual potency (an apparent exception is a persistent vaginal bleeding in anorexic females that follows replacement hormonal therapy such as contraceptive pills). High concentrations of growth hormone and of cortisol may also be present as well as alterations in thyroid hormone metabolism and anomalies in insulin secretion.
e) If AN starts prior to adolescence, puberty manifestations are delayed or even halted (stunted growth; women do not develop their breasts and there is primary amenorrhea; in males underdeveloped genitalia persist). If there is recovery from AN, complete puberty usually takes place but the first menstrual period is delayed.

F50.1 Atypical anorexia nervosa

There are cases where one or more of the primary characteristics of anorexia nervosa are absent (F50.0), such as amenorrhea or significant weight loss but otherwise present a characteristic clinical profile.

Patients who present all important symptoms from anorexia nervosa at a milder stage can also be included here.

This term should not be used to describe eating disorders similar to anorexia nervosa but that are associated with a known somatic etiology.

Adapted from: International Statistical Classification of Diseases and Related Health Problems 10th ed. WHO criteria. F50-59 Behavior disorders associated with physiological dysfunctions and somatic factors.

Anorexia, defined as the loss of the desire to eat, is common in cancer patients. A study of 66 cancer patients nearing the end of life showed that 61% had anorexia despite the fact that they were not receiving chemotherapy. This suggests that anorexia can be produced by the tumor independently of that produced by treatment, which is reversible when the treatment is terminated. Early satiety is often reported by anorectic cancer patients, such that they feel full after ingestion of a small amount of food. This may be the result of an encroachment by the tumor on the gastrointestinal tract, which may hinder the passage of food. In addition, tumors may produce abnormalities in the mucosa resulting in malabsorption. Although anorexia frequently accompanies cachexia, there does not appear to be a cause-effect relationship between the two (16, 17).

According to the results of the last studies; in 2008 Evans et al. again presented cachexia as a syndrome, distinguished from starvation and other secondary causes of wasting, with characteristic weight loss: Cachexia is a complex metabolic syndrome… characterized by loss of muscle with or without loss of fat mass… Anorexia, inflammation, insulin resistance, and increased muscle protein breakdown are frequently associated… Cachexia is distinct from starvation, age-related loss of muscle mass, primary depression, malabsorption and hyperthyroidism and is associated with increased morbidity (18).

Newer descriptions have not significantly expanded the clinical picture. Today, there is stil no consensus definition, hindering research on early diagnosis and effective therapy. The language descriptors used to characterise the syndrome are important. For example, the word ‘cachexia’ itself may mislead; perhaps cancerrelated wasting syndrome is more

accurate. Cancer anorexia-cachexia syndrome is a disorder associated with high morbidity and mortality, and deserves greater attention in both clinical and translational research (19).

Sarcopenia:

Sarcopenia is a loss of muscle protein mass and loss of muscle function. It occurs with increasing age, being a major component in the development of frailty. The rate of muscle loss is estimated to be 1–2% per year after the age of 50 yr and can affect even healthy physically active adults. Secondary to loss of skeletal muscle mass, there is a corollary decrease in functional independence and the ability to perform activities of daily living within the elderly population. Approximately 25% of people above the age of 70 yr and 40% of those who have reached the age of 80 yr are clinically sarcopenic. Additionally, aging-associated skeletal muscle loss also leads to an increased risk of falls, fractures, dependency, and all-cause mortality. Mechanisms that regulate age-related loss of skeletal muscle mass are not well defined, but the pathogenesis is likely multifactorial. With age, in a process similar to that occurring in many other tissues, there is a gradual decline of regenerative potential in skeletal muscle. Studies suggest that the intrinsic regenerative capacity of aged satellite cells remains intact. Apoptosis, or programmed cell death, increases in skeletal muscle cells with aging and may also contribute to aging-associated sarcopenia. Thus, a combined approach targeting both diminished satellite cell regenerative potential and increased muscle cell apoptosis may present a framework for therapeutic intervention of aging-associated sarcopenia. Testosterone, through its anabolic effects on muscle, is an important determinant of body composition in humans. Therefore, it is not surprising that testosterone supplementation increases muscle mass in healthy young and old men, healthy hypogonadal

men, older men with low testosterone levels, and men with chronic illness and low testosterone levels. A recent multicenter study of testosterone therapy in older men further documented significant gains in total and appendicular lean mass, muscle strength, and aerobic endurance with significant reductions in whole-body and trunk fat.

The testosterone-induced increase in muscle size in both young and old men is associated with hypertrophy of muscle fibers and significant increases in myonuclear and satellite cell numbers. The mechanisms by which testosterone increases satellite cell number and promotes muscle growth in aging are not well understood (20,21). As the proportion of older persons in the world's population continues to increase, sarcopenia will dramatically impact many lives and place everincreasing demands on health care systems. Therapeutic strategies are needed to ameliorate the effects of ageing on skeletal muscle structure and function. While the exact cellular and molecular mechanisms for the age-related loss of protein have yet to be elucidated fully, they are likely highly complex and involve multiple cell signalling pathways. It has been highlighted some of the important age-related changes to the systemic environment: testosterone, GH/IGF-I axis, thyroid hormones, catecholamines and cytokines and those changes intrinsic to skeletal muscle: MRFs, notch, myostatin and calcium. It has been needed to better understand the mechanisms underlying sarcopenia and to help identify novel treatments (22).

Treatment:

Professional teams of oncology physicians, nurses, and dietitians, along with patients and families, can diagnose specific needs and plan individualized treatment for improved nutritional health.

Counseling, which any member of the health care team may provide, is an effective and inexpensive intervention and should be combined with other nutritional interventions.

Effective communication with patients and their families is essential and is an important component of treatment. Anorexia and cachexia may result in a secondary depression, or the depression may be a prime contributor to the anorexia and subsequent weight loss. Benzodiazepines can be helpful for persistent fear and anxiety and antidepressant drugs are increasingly used in depressed cancer patients (23). Large, randomized controlled trials are warranted to define the exact role of megestrol acetate in preventing and treating anorexia in patients on hemodialysis who are malnourished. First-line approaches in managing the malnourished patient on hemodialysis include: 1) Ensuring adequate dialysis. 2)Discontinuing any medications that may be causing anorexia. 3)Treating gastroparesis. 4)Offering nutritional guidance that encourages the use of nutritional supplements. Until further studies are completed, the administration of megestrol acetate, 400 mg twice daily, may be an effective intervention to correct anorexia, mitigate inflammation, and improve the nutritional state of patients on dialysis who are hypoalbuminemic (24,25).

The refeeding syndrome, a problem of electrolyte and fluid shifts, can cause permanent disability or even death. It is essential to identify at-risk patients, to monitor them carefully, and to initiate a nutritional rehabilitation program that aims to avoid the refeeding syndrome. A judicious, slow initiation of caloric intake, requires daily management to respond to entities such as liver inflammation and hypoglycemia that can complicate the body's conversion froma catabolic to an anabolic state.

In addition, nutritional rehabilitation should take into account clinical characteristics unique to these patients, such as gastroparesis and slowed colonic transit, so that measures can be taken to ameliorate the physical discomforts of weight restoration. Adjunct methods of refeeding such as the use of enteral or parenteral nutrition may play a small but important role in a select patient group who cannot tolerate oral nutritional rehabilitation alone (26-29). Enteral nutrition was not given for long time to patients with acute pancreatitis because of the fear of worsening the outcome. This opinion has changed in the last decade. The importance and limits of enteral nutrition are well explained (30).

Studies in malnourished elderly in patients have shown an improvement in body weight and survival and a reduction in the incidence of complications after oral nutritional support. Several measures are recommended to increase food intake: a) following French National Nutrition Health Program (PNNS) advice for the elderly: meat, fish or eggs: two servings a day milk and dairy products: three to four servings a day bread, other cereal foods, potatoes or pulses at each meal at least five portions of fruit and vegetables every day 1-1.5 L a day of water (or other drinks: herbal tea, fruit juice, etc) and drinking before feeling thirsty. b) increasing eating frequency during the day by splitting up meals, making sure that elderly persons eat at least three meals a day and by proposing snacks between meals c) not allowing the patient to go without food for too long during the night (>12 h) by delaying dinner and advancing breakfast and/or by proposing a snack; d) providing mainly high-energy and/or high-protein foods; e)designing menus to suit patients' preferences and modifying food texture according to chewing and swallowing ability;

f) organizing technical and/or human assistance for feeding according to the person's disabilities; e) providing meals in pleasant surroundings (dining room and companions) (31).

As a result; medical personel must be aware that malnutrition afflicts even patients whose background is not suggestive of malnutrition. Best results are achieved when cooperation of all staff members is enlisted, because malnutrition has severe consequences and can be treated easily. As a general view reducing malnutrition will require nutrition-sensitive actions that take place in the context of multi-sectoral programs in agriculture, health, education, and social protection (32,33).

Referencies

1) The State of Food Insecurity in the World, Economic growth is necessary but not suffcient to accelerate reduction of hunger and malnutrition, Food and agriculture organization of the united nations, Rome, FAO, 2012

2) Weisstaub G and Araya M; Acute Malnutrition in Latin America: The Challenge of Ending Avoidable Deaths, Journal of Pediatric Gastroenterology and Nutrition 47:S10–S14, 2008

3) Nube´ M, Sonneveld B. The geographical distribution of underweight children in Africa. Bull WHO 2005;83:764–70.

4) Joosten KFM and Hulst JM; Prevalence of malnutrition in pediatric hospital patients, Curr Opin Pediatr 20:590–596, 2008.

5) Elia M, Stratton R, Russel C, Green C, Pang F. The costs of disease-related malnutrition in the UK and economic considerations for the use of oral nutritional supplements (ONS) in adults. Redditch, Bapen, 2005.

6) Müller O, Krawinkel M. Malnutrition and health in developing countries. CMAJ 2005;173:279–86.

7) Millward DJ, Jackson AA. Protein/energy ratios of current diets in developed and developing countries compared with a safe protein/energy ratio: implications for recommended protein and amino acid intakes. Public Health Nutr 2004;7:387-405.

8) Meijers JMM, Awareness of malnutrition in healthcare: the Dutch perspective. Thesis Maastricht University, Maastricht, Printed by: Elsevier, gezondheidszorg, 2009

9) Elia M, L. Zellipour L,Stratton RJ; To screen or not to screen for adult malnutrition? Clinical Nutrition, 24, 867–884, 2005

10) Chalipat SS, Mishra A , Tambolkar SA, Agarkhedkar S , Saini N. Effect of Malnutrition on Severity of Presentation and Outcome of Acute Bronchiolitis . WebmedCentral PAEDIATRICS 2013; 4 (2)

11) Baron BR; Nutritional disorders, Chapter 29, CMDT, 2011

12) Stewart GD, Skipworth RJE and Fearon KCH; The Anorexia-Cachexia syndrome, Chapter 106, 2011

13) Miranda-Sanchez S; Anorexia nervosa: nutritional treatment in pediatrics, Review article, Bol Med Hosp Infant Mex, Vol:67, 2010

14) APA American psychiatric association. Am J Psychiatry 2006; 163 (7 suppl):4-54.

15) Garfinkel PE, Lin E, Goering P, Spegg C, Goldbloom D, Kennedy S, et al. Should amenorrhea be a criteria fort he diagnosis of anorexia nervosa? Br J Psychiatry 1996; 168: 500-506.

16) J. Tisdale M; Mechanisms of Cancer Cachexia, Physiol Rev, 89: 381–410, 2009

17) Trammer JE, Heyland D, Dudgeon D, Groll D, Squires-Graham M, Coulson K. Measuring the symptom experience of seriously ill cancer and noncancer hospitalised patients near the end of life with the memorial symptom assessment scale. J Pain Symptom Management 25: 420–429, 2003.

18) Evans WJ, Morley JE, Argiles J et al. Cachexia: a new definition. *Clin Nut* 2008; 27:793–9.

19) Bennani-Baiti N, Walsh D; What is cancer anorexia-cachexia syndrome? A historical perspective, J R Coll Physicians Edinb 2009; 39:257–62

20) Y. Rolland, S. Czerwinski, G. Abellan van Kan, J. E. Morley, M. Cesari, G. Onder, J. Woo, R. Baumgartner, F. Pillard and Y. Boirie, et al. Sarcopenia: Its assessment, etiology, pathogenesis, consequences and future perspectives The Journal of Nutrition, Health & Aging, 2008,Volume 12, Number 7, 433-450,

21) Kovacheva EL, Sinha Hikim AP, Shen R, Sinha I, Sinha-Hikim I. Testosterone Supplementation Reverses Sarcopenia in Aging through Regulation of Myostatin, c-Jun NH2-Terminal Kinase, Notch, and Akt Signaling Pathways. Endocrinology; 2010; 151(2):628-38.

22) Ryall JG, Schertzer JD and Lynch GS: Cellular and molecular mechanisms underlying age-related skeletal muscle wasting and weakness, Biogerontology (2008) 9:213–228

23)Inui A: Cancer Anorexia-Cachexia Syndrome: Current Issues in Research and Management. CA Cancer J Clin 2002;52:72-91.

24) Shumaker T: Treating Malnutrition in Patients on Hemodialysis.Nephrology Nursing Journal 36 (1), 2009

25) Rammohan, M., Kalantar-Zadeh, K., Liang, A., & Ghossein, C. (2005). Megestrol acetate in a moderate dose for the treatment of malnutrition-inflammation complex in maintenance dialysis patients. Journal of Renal Nutrition, *15*, 345-355.

26)Mehler PS, Winkelman AB, Andersen DM and Gaudiani JL Nutritional Rehabilitation: Practical Guidelines for Refeeding the Anorectic Patient. Review Article, Journal of Nutrition and Metabolism, Article ID 625782, 7 pages, 2010.

27) Mehler PS and Weiner KL, "Use of total parenteral nutrition in the refeeding of selected patients with severe anorexia nervosa," International Journal of Eating Disorders, vol. 40, no. 3, pp. 285–287, 2007.

28) A. Diamanti, M. S. Basso, M. Castro, et al., "Clinical efficacy and safety of parenteral nutrition in adolescent girls with anorexia nervosa," Journal of Adolescent Health, vol. 42, no. 2, pp. 111–118, 2008.

29) Mehler PS; "Use of total parenteral nutrition in severe anorexia nervosa complicated by a gastrointestinal illness," Current Nutrition and Food Science, vol. 4, no. 1, pp. 41–43, 2008.

30) Chermesh I, Sobotka L, Hartman C and Meier R: Malnutrition and Nutrition-Therapy: Our Neglected Responsibility, Editorial, Gastroenterology Research and Practice, Article ID 842085, 2 pages, 2011.

31)Raynaud-Simon A, Revel-Delhom C, Hébuterne X :Clinical practice guidelines from the French health high authority: Nutritional support strategy in protein-energy malnutrition in the elderly. Clinical Nutrition, 30, 312-319,2011

32) Ben-Ishay O, Gertsenzon H, Mashiach T, Kluger Y and Chermesh I; Malnutrition in SurgicalWards: A Plea for Concern. Gastroenterology Research and Practice, Article ID 840512,4 pages, 2011.

33) Mucha N; Implementing Nutrition-Sensitive Development: Reaching Consensus, Briefing paper, Bread for the World Institute, number: 20, 2012