CHAPTER

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Weight Loss – A Practical Approach

SV Ramana Murty

ABSTRACT

Weight loss is one of the common ailments encountered by the physician in medical out patient departments all over the world. India is not an exception. Many individuals may present with sarcopenia or cachexia. To quantify the weight loss, body mass index appears to be the best indicator.

Weight loss may be voluntary or involuntary / unintended. Unintended weight loss may be associated with many diverse conditions; tuberculosis, HIV/AIDS, chronic worm infestation, cancer or collagen vascular disorders occasionally psychiatric disorder.

It will be prudent to investigate all cases with a methodical approach; which should include meticulous history, thorough clinical examination and appropriate investigations, so that it can unravel hidden cause and go a long way towards the diagnosis and management of weight loss.

INTRODUCTION

Over the past few decades there has been a dramatic increase in concern over the extremes of weight; weight loss or gain! It is evident that an individual with over weight is suspected to have hyperlipidemia and coronary artery disease and the one with underweight may be suspected to have hyperthyroidism, type 1 diabetes or to rule out slim disease (HIV/AIDS).

Clinically significant involuntary/ unintentional weight loss is defined as a loss of 4.5 kg or > 5% of the usual body weight over a period of 6 - 12 months, especially when progressive. Weight loss of > 10% of normal body weight is considered to represent protein-energy malnutrition (PEM).

Types of weight loss

Voluntary weight loss

- Loss of body weight with deliberate use of weight reducing drugs or foods, exercise, or bariatric surgery.

Involuntary / Unintentional weight loss

- Loss of body weight occurring unintentionally in individuals due to the presence of disease or ingestion of drugs or exposure to toxins or radiation.

Note

- Physiological weight loss: Weight loss due to dieting, exercise, starvation or decreased nutritional intake which accompanies old age.
- Pathological weight loss: Weight loss due to systemic disease, advanced disease of any organ system or psychiatric illness.

Epidemiology

- Involuntary weight loss (IWL) is seen in ~ 8% of adult population.
- ~ 27 % of elderly > 65 years suffer from IWL.[1]
- ~ 25% of individuals with IWL may not have evident cause.
- Significant weight loss is associated with increased mortality, 9 - 38 % within 1 to 2.5 years in the absence of clinical attention.
- Mortality rates appear to be increased when weight loss is involuntary

DEFINITION

Clinically weight loss is defined as loss of more than 5 percent of usual body weight in six to twelve months.[2]

PATHOPHYSIOLOGY

Weight loss results when more calories are expended than taken in (ingested and absorbed). Disorders that increase expenditure or decrease absorption tend to increase appetite. More commonly, inadequate caloric intake is the mechanism for weight loss and such patients tend to have decreased appetite. Sometimes, several mechanisms are involved. For example, cancer tends to decrease appetite but also increases basal caloric expenditure by cytokine-mediated mechanisms. Obesity / weight gain is the most common reason for deliberate decrease in food intake.

TERMINOLOGY

- Sarcopenia is a geriatric syndrome of diminished muscle mass and function, which may or may not be accompanied by unintentional weight loss.[3]
- Cachexia is a syndrome of weight loss characterized by decreased muscle mass in the presence of the metabolic effects of an underlying illness such as some types of cancer or advanced heart failure.[4]

Physiological considerations

- Lean body mass (fat free mass) begins to decline at a rate of 0.3 kg per year from third decade onwards.
- The total body weight peaks in sixth decade of life

and generally remains stable until ninth decade, after which it gradually declines.

- The rate of decline in lean body mass increases further at 60 in men and at 65 in women.
- Loss of sex steroids at menopause in women and more gradually with aging in men also contributes. In the healthy elderly an increase in fat tissue balances the loss in lean body mass until very old age.[5]
- Decreased hunger is a reflection of reduced physical activity and loss of lean body mass producing lower demand for calories and food intake.
- At cellular level telomeres shorten and body cell mass (the fat free part of the cell) declines steadily with aging.

ETIOLOGY

Unintentional weight loss with decreased appetite

- Chronic collagen vascular disorders
  - Rheumatoid arthritis, sarcoidosis, SLE, polyarteritis nodosa etc.
- Infections
  - Tuberculosis, HIV, Viral hepatitis B, C, chronic lung abscess, empyema, chronic fungal or bacterial infections, chronic helminthic infestation, etc.
- Gastrointestinal disorders
  - Peptic ulcer disease, malabsorption, dysphagia, inflammatory bowel disease etc.
- Vitamin deficiency; e.g. Vitamin D def.[6]
- Psychiatric disorders
  - Anxiety disorder, depression, bipolar II disorder[7] etc.
- Malignancy
  - Prostatic, renal or lung cancer; lymphomas, or GI malignancies etc.
- Neurologic disorders
  - Parkinson disease, motor neuron disease, Alzheimers disease etc.
- Disease of liver (cirrhosis) lungs (chronic Bronchiectasis), heart (CCF), kidneys (CKD) etc.
- Drug abuse: opiates, alcohol, heroin, etc.

Unintentional weight loss with increased appetite

- Vigorous physical activity; like active involvement in sports and games
- Uncontrolled type 1 diabetes
- Hyperthyroidism

CLINICAL ASSESSMENT

Voluntary weight loss

- History suggestive of deliberate dieting, lifestyle modifications, low fat diet, and regular aerobic / anaerobic exercises or bariatric surgery.

Note

The four major manifestations of unintended weight loss

- Anorexia
- Dehydration
- Cachexia (weight loss, loss of muscle, adipose tissue, anorexia and weakness)
- Sarcopenia (loss of muscle mass)

All elderly people are to be screened for:

- Simplified nutritional assessment,
- Observation of eating habits,
- Activities of daily living,
- Dementia and depression
- Cancer screening

History of present illness

- Questions about the amount of weight loss; whether acute or chronic.
- Appetite, food intake, and bowel patterns should be described.
- For repeat evaluations, patients should keep a food diary.
- Symptoms of potential causes are noted, such as fatigue, malaise, fever, and night sweats. for which the individual may attribute to fate theory or horoscope.
- Thorough evaluation of elderly is required.[8]

Past medical history

- May reveal a disorder capable of causing weight loss. e.g. tuberculosis, hyperthyroidism
- Consumption of "Over the counter drugs"; drugs prescribed by doctors or recreational drugs, and Herbal products through advertisements.
- Social history may reveal changes in living situations that could explain why food intake is decreased (e.g. loss of communal eating).
- Individual reasons; loss of loved one, loss of independence or job.

Physical examination: Certain indicators

- Ideal body weight = 22.5 X height in meters^2
- Brocas Index: Height in cms – 100
- Body Mass Index (BMI)
- Skin fold thickness
- Mid arm circumference
- Waist hip ratio

Table 1: BMI in Different Groups	
BMI < 18.5:	Below normal weight
BMI >= 18.5 and < 25:	Normal weight
BMI >= 25 and < 30:	Overweight
BMI >= 30 and < 35:	Class I Obesity
BMI >= 35 and < 40:	Class II Obesity
BMI >= 40:	Class III Obesity

"Body Mass Index" appears to be the most suitable one when we deal with weight loss

How to Calculate Body Mass Index?

BMI = Weight in kg / height in Meter^2

Note1

- The term "BMI" was first invented in the 19th century by a Belgian polymath called Adolphe Quetelet, hence it is also known as "Quetelet Index".
- Interpretation of body mass index into different categories can be obtained with reference to Quetelet's index[9,10] wide Table 1.

Note2.

- Vital signs are checked for fever, tachycardia, tachypnea, and hypotension.
- Triceps skin fold thickness wide. Figure 6, Table 2 and mid upper arm circumference can be measured to estimate lean body mass.
- Examination of the heart, lungs, abdomen (liver, spleen), rectum (including prostate) and testing for occult blood), head and neck, breasts, central nervous system, lymph nodes, joints, skin.
- Special attention to be drawn towards behavior, mood, and affect; since chronic psychiatric conditions are known to cause cachexia.

To be noted with caution!

- Fever, night sweats, generalized lymphadenopathy
- Headache, jaw claudication, and/or visual disturbances in an older adult
- Roth spots, Janeway lesions, Osler nodes, splinter hemorrhages, retinal artery emboli
- Dyspnea, cough, hemoptysis
- Bone pain
- Inappropriate fear of weight gain in an adolescent or young woman
- Polydipsia and polyuria

Clinical correlation with common findings

- Cough, dyspnea, hemoptysis: Lung cancer, TB, Sarcoidosis, Fungal pneumonias
- Fatigue: Adrenal insufficiency, cancer, chronic kidney disease, depression, infections, giant cell arteritis, nephrotic syndrome, sarcoidosis
- Sleep disturbance, loss of libido, sadness, depression
- Heat intolerance, tremor, anxiety, sweating: hyperthyroidism
- Polyuria, polyphagia, polydipsia: type 1 diabetes mellitus
- Headache or visual symptoms and muscle pains in an older adult: Giant cell arteritis (temporal arteritis)
- Fever, night sweats: cancer, infections, giant cell arteritis
- Bone pain not related to activity, especially prominent at night: cancer: multiple myeloma, bone metastases from breast, prostate, or lung cancer
- Rectal bleeding, abdominal pain : colorectal cancer
- Lymphadenopathy: Infections, cancer, sarcoidosis
- Edema: hypoprotenemia, chronic kidney disease,
- Hematuria: Renal or prostate cancer
- Ascites: Nephrotic syndrome, alcoholism, CCF

Table 2: Skin Fold Thickness Measurement			
	Standard	**80%**	**60%**
Adult Male	12.5	10.0	7.5
Adult Female	16.5	13.0	10.0
Nutritional status	Normal	Moderate	Poor

Note: The 80% and 60% ranges are associated with moderate and severe nutritional depletion

Note

- Pathologically malnutrition can affect immune response; wound healing, muscle strength; sometimes respiratory muscles; heat regulation and water and electrolyte disturbances.
- Clinically Serious weight loss may reduce the quality of life, impair the treatment effectiveness or recovery and worsen the disease processes and be a risk factor for high mortality rates.

Useful questionnaire

- How much weight have you lost? Slow or fast?
- When did the weight loss begin?
- Are you doing vigorous exercise?
- Are you eating less, do you have any dental problems or mouth sores?
- Do you have more stress or anxiety than usual?
- Have you history of recurrent vomiting?

Table 3: Tuberculosis; Age –BMI Correlation

			BMICAT				Total
			Under WT	Normal	Over WT	Type 1 OB	
AGECAT	AGE <20	Count	0	4	0	0	4
		% within AGECAT	0.0%	100.0%	0.0%	0.0%	100.0%
	AGE 21-40	Count	14	9	1	0	24
		% within AGECAT	58.3%	37.5%	4.2%	0.0%	100.0%
	AGE 41-60	Count	15	9	1	0	25
		% within AGECAT	60.0%	36.0%	4.0%	0.0%	100.0%
	AGE 61-80	Count	7	0	0	1	8
		% within AGECAT	87.5%	0.0%	0.0%	12.5%	100.0%
Total		Count	36	22	2	1	61
		% within AGECAT	**59.0%**	**36.1%**	3.3%	1.6%	100.0%

Table 4: Tuberculosis; Gender – BMI Correlation

			BMICAT				Total
			Under WT	Normal	Over WT	Type 1 OB	
Sex	F	Count	10	6	0	0	16
		% within SEX	62.5%	37.5%	0.0%	0.0%	100.0%
	M	Count	26	16	2	1	45
		% within SEX	57.8%	35.6%	4.4%	2.2%	100.0%
Total		Count	36	22	2	1	61
		% within Sex	59.0%	36.1%	3.3%	1.6%	100.0%

- Do you have increased hunger, sweating, palpitations, stools and tremor?
- Have you diarrhea or constipation?
- Are you drinking more water than previous?
- Is there history of frequent micturition?
- Do you feel sad or depressed?
- What medicines are you taking frequently without doctor's prescription?

Lab tests

- Complete blood counts
- Serum chemistry (serum electrolytes, calcium, hepatic and renal function tests)
- Ferritin levels
- Thyroid function tests, Serum levels of vitamin D_3
- ESR and C- reactive protein
- Complete urinalysis
- HIV screening if indicated
- Chest radiography
- Abdominal ultra sound
- Age, sex and risk factor- specific cancer screening tests such as mammography and colonoscopy
- If weight loss continues and all other findings remain normal, further testing (eg, CT, MRI) should be considered.

Management

- Identify and treat the underlying cause.
- Treat the underlying metabolic, psychiatric, infectious or other systemic disorder.
- Then restore functional status gradually.
- Medications causing nausea or anorexia should be avoided or changed.
- The underlying disorder is treated. If an underlying disorder causes under nutrition and is difficult to treat, nutritional support should be considered.
- Helpful general behavioral measures include encouraging patients to eat, assisting them with feeding, offering snacks between meals and before bedtime.
- Providing favorite or strongly flavored foods, and offering only small portions.
- If behavioral measures are ineffective and weight loss is extreme, enteral tube feeding can be tried if patients have a functioning GI tract.
- Measures of lean body mass are followed serially.
- Appetite stimulants have not been shown to prolong life.

Table 5: Cancer; Age – BMI Correlation

			BMICAT				Total
			Under WT	Normal	Over WT	Class 1 OB	
AGECAT	Age Below 20	Count	3	1	0	0	4
		% within AGECAT	75.0%	25.0%	0.0%	0.0%	100.0%
	Age 21-40	Count	2	10	5	2	19
		% within AGECAT	10.5%	52.6%	26.3%	10.5%	100.0%
	Age 41 -60	Count	9	22	8	2	41
		% within AGECAT	22.0%	53.7%	19.5%	4.9%	100.0%
	Age Above 61	Count	5	18	6	3	32
		% within AGECAT	15.6%	56.3%	18.8%	9.4%	100.0%
Total		Count	19	51	19	7	96
		% within AGECAT	19.8%	53.1%	19.8%	7.3%	100.0%

- In addition, malnutrition can lead to vitamin and other deficiencies and to inactivity, which in turn may pre-dispose to other problems, such as pressure sores.
- Unintentional weight loss can be the characteristic leading to diagnosis of diseases such as cancer and Type 1 diabetes.
- Some medications e.g. metformin can cause weight loss, while others can cause weight gain.

ARE THERE ANY CONSTRAINS?

Social conditions

- Social conditions such as poverty, social isolation and inability to get or prepare preferred foods can cause unintentional weight loss, and this is most common in older people living alone.
- Nutrient intake can also be affected by culture e.g. Indian vegetarians avoid non veg. items, due to family traditions. Sometimes Ill-fitting dentures and other dental or oral health problems can also affect adequacy of nutrition.
- Loss of hope, status or social contact and spiritual distress can cause depression, which may be associated with reduced nutrition.

Treatment related

- Medical treatment with certain drugs (cancer chemotherapy drugs, DMARDs can directly or indirectly cause weight loss, impairing the treatment effectiveness and recovery.

Surgery related

- Many patients will be in pain and have a loss of appetite after surgery.
- Certain patients of TB intestines may undergo resection of large segments leading to malabsorption.

Some important conditions with weight loss

Pulmonary Tuberculosis[11]

Evening rise of temperature, night sweats, cough, Hemoptysis, coupled with poor living conditions. Sputum for AFB will clinch the diagnosis; and treated with appropriate regimen of anti tuberculosis drugs.

Hyperthyroidism[12]

Increased appetite, loss of weight, anxiety tremor, sweating, diarrhea – T3, T4 raised and TSH decreased - treated with Propylthiouracil, carbimazole or methimazole

Bacterial endocarditis[13]

Fever, night sweats, joint pains, shortness of breath, fatigue, valvular heart disease, Musical murmurs – echocardiography, blood cultures required- treated with appropriate intravenous antibiotics for 4-6 weeks.

Sarcoidosis

A disease of unknown etiology with noncaseating granulomas, fever, fatigue, cough, SOB, night sweats, mediastinal lymphadenopathy, CVS – conduction defects; CNS- seizures, facial palsy, treated with corticosteroids.

Adrenal insufficiency

Adrenal insufficiency resulting from destruction of adrenal cortex, low glucocorticoid, mineralocorticoids, low adrenal androgens – malaise, fatigue, general weakness, nausea, vomiting, anorexia weight loss. It is treated with steroid replacement.

HIV / AIDS[14]

Fever, diarrhoea, lymphadenopathy, SOB, associated fungal infections due to reduced immune status – western blot positive and HIV viral load – treated with HAART and other suitable measures.

Malabsorption syndrome[15]

Diarrhoea, steatorrhea, weight loss and fatigue, flatulence and abdominal distention, anemia and edema, bleeding disorders, bone pain and pathologic fractures, - endoscopy, CT and Ultra Sound abdomen, barium studies, tests for fat, carbohydrate and protein absorption, - treated with gluten free diet if necessary, avoidance of milk and milk products, corticosteroids, low fat diet.

Worm infestation[16]

Fever and abdominal pain, bloating, flatulence, diarrhoea,

Fig. 1: M40 yr, BMI - 12.64kg/m^2; Height 164cm, Weight 34 kg; Alcoholic with Malnutrition

Fig. 3: F35 yr, BMI- 13.67kg/m^2 ; Height 153cm, Weight 32kg; Carcinoma Esophagus

- microscopic examination of stools reveal ova.- treated with albendazloe / mebendazole.

Giant cell arteritis[17]

Elderly people with headache, muscle pain, Jaw claudication, fever, visual disturbances; blood counts (raised ESR), Temporal artery biopsy; Treated with corticosteroids.

Depression[18]

Fatigue, sadness, loss of sexual desire or pleasure, sleep disturbances – detailed history is important. –physical examination-normal, treated with antidepressants and behavioral therapy.

Cancer

Night sweats, fatigue, fever, bone pain, organ related

Fig. 2: M25 yr BMI - 13.72kg/m, Height 171cm, Weight40 kg; Pulmonary Tuberculosis

Fig. 4: M30 yr, BMI - 14.2kg/m^2; Height 168cm, Weight 40kg; Type 1 Diabetes Mellitus

complaints- dysphagia in case of carcinoma esophagus, jaundice and pain abdomen in case of Hepatocellular carcinoma, cough and Hemoptysis in case of bronchogenic carcinoma, rectal bleed in cases of colorectal cancer, breast cancer[19,20] etc. Appropriate chemotherapy/ Surgery/ Radiotherapy.

Alcoholism[21]

History of drinking excess alcohol, features suggestive of liver cell failure, gynaecomastia, breast atrophy, bilateral parotid enlargement etc. Appropriate behavioral counseling / De-addiction therapy.

Note

Cross sectional retrospective studies with respect to patients with pulmonary tuberculosis and patients with cancer reveled following results with regard to BMI

Fig. 5: M60 yr, BMI - 14.69kg/m; Height 165cm, Weight 40kg; Pulmonary Tuberculosis

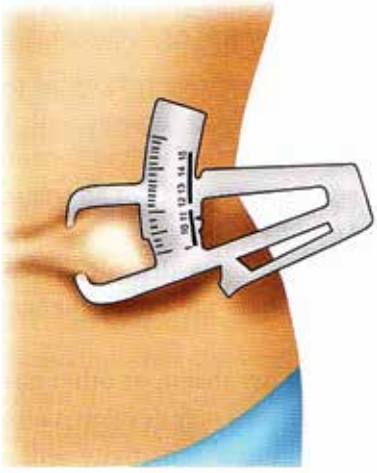

Fig. 6: Skin Fold Thickness Measurement

Pulmonary tuberculosis

- In patients with sputum positive pulmonary tuberculosis: 45 are males and 16 are females (total 61 patients, age ranging from 18 to 80 years). 36(59.0%) are under weight, 22 (36.1%) are normal weight and 3(4.9%) are over weight and obese. (P value - 0.035) wide Tables 3 and 4.

Cancer

- In patients with cancer 19(19.8%) are under weight, 51(53.1%) are normal weight and 26(27.1%) are over weight and obese (Total 96 patients, age ranging from 18 to 80 years). (P value - 0.325) wide Table 5.

CONCLUSION

Involuntary or unintentional weight loss is a significant cause of morbidity and mortality, which can be either minimized or prevented depending on case scenario. Most of the times, the cause is approachable, identifiable and manageable. Barring certain congenital diseases like cystic fibrosis, in many situations, it can be addressed to a reasonable level of satisfaction with a methodical approach, wide Figure 7.

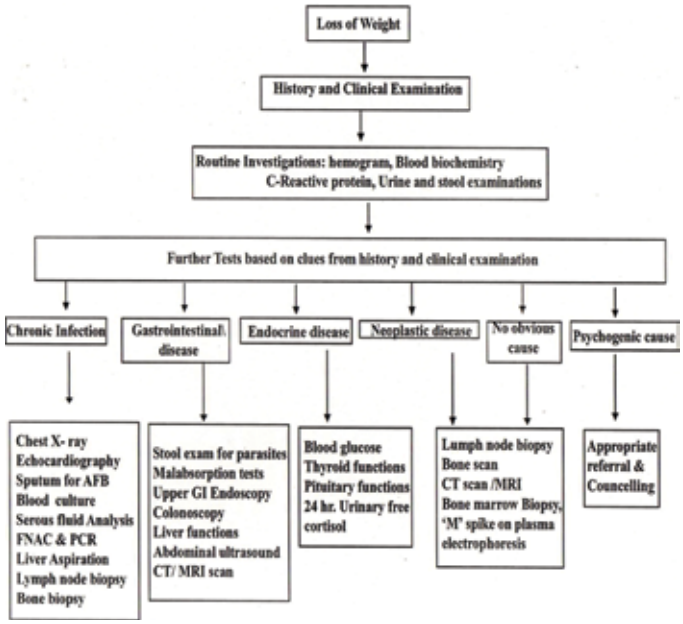

Fig. 7: Algorithm

REFERENCES

1. Alibhai SM, Greenwood C, Payette H. An approach to the management of unintentional weight loss in elderly people. *CMAJ* 2005; 172:773-780
2. Wong CJ. Involuntary weight loss: *Med Clin North Am* 2014; 98:625.
3. Bales CW, Ritchie CS, Sarcopenia, weight loss, and nutritional frailty in the elderly. *Annu Rev Nutr* 2002; 22:309.
4. ZamboniM, Rossi AP, Corzato F, Bambace C, Mazzali G, Fantin F. Sarcopenia, Cachexia and congestive heart failure in the elderly. *Endocr Metab Immune Disord Drug Targets* 2013; 13:58-67.
5. Compston, Juliet E. et al. "Increase in Fracture Risk Following Unintentional Weight Loss in Postmenopausal Women: The Global Longitudinal Study of Osteoporosis in Women." *Journal of bone and mineral research : the official Journal of the American Society for Bone and Mineral Research* 2016; 31.7:1466–1472.
6. Holick MF. Resurrection of vitamin D deficiency and rickets. *The Journal of Clinical Investigation* 2006; 116:2062-2072. doi:10.1172/JCI29449.
7. Judd LL, Akiskal HS, Schettler PJ, et al A prospective investigation of the natural history of the long-term weekly symptomatic status of bipolar II disorder. *Arch Gen psychiatry 2003*; 60:261
8. Robbins LJ. Evaluation of weight loss in the elderly. *Geriatrics 1989*; 44:31
9. National Institutes of Health (NIH), National Heart, Lung, and Blood Institute (NHLBI). The practical guide: identification, evaluation, and treatment of overweight and obesity in adults. *Bethesda: National Institutes of Health 2000*, NIH publication 00-4084.
10. Khosla T, Lowe CR. Indices of obesity derived from body weight and height. *Br J Prev Soc Med* 1967; 21:122-128.
11. Schwenk A, Macallan DC. Tuberculosis, malnutrition and wasting. *Curr Opin Clin Nutr Metab Care 2000*; 3:285–291. [PubMed]
12. Dutta P, Bhansali A, Walia R, Khandelwal N, Das S,

Masoodi SR. Weight homeostasis & its modulators in hyperthyroidism before & after treatment with carbimazole. *The Indian Journal of Medical Research* 2012; 136:242-248.

13. Yuan S-M. Right-sided infective endocarditis: recent epidemiologic changes. *International Journal of Clinical and Experimental Medicine* 2014; 7:199-218.
14. Sebastian, Shibu Thomas, and Sunitha Siddanna. "Social, Psychological and Health Concerns of People Living with HIV/AIDS in Mysore District, Karnataka." *Journal of Clinical and Diagnostic Research : JCDR* 10.3 (2016): LC06–LC10. *PMC*. Web. 19 Aug. 2016.
15. Ghoshal UC, Mehrotra M, Kumar S, et al. Spectrum of malabsorption syndrome among adults & factors differentiating celiac disease & tropical malabsorption. *The Indian Journal of Medical Research* 2012; 136:451-459.
16. Acka CA, Raso G, N'Goran EK, et al. Parasitic Worms: Knowledge, Attitudes, and Practices in Western Côte d'Ivoire with Implications for Integrated Control. Diemert DJ, ed. *PLoS Neglected Tropical Diseases* 2010; 4:e910. doi:10.1371/journal.pntd.0000910
17. Shukla S, Hull R. Unintentional weight loss. Think of giant cell arteritis. *BMJ* 2011; 342:d2889
18. Grover S, Dutt A, Avasthi A. An overview of Indian research in depression. *Indian Journal of Psychiatry* 2010; 52(Suppl1):S178-S188. doi:10.4103/0019-5545.69231.
19. Mathew, A et al. "Anthropometric Factors and Breast Cancer Risk among Urban and Rural Women in South India: A Multicentric Case–control Study." *British Journal of Cancer* 99.1 (2008): 207–213. *PMC*. Web. 19 Aug. 2016.
20. Davis IJ et al. unintentional weight loss as the sole indication colonoscopy is associated with colorectal cancer. *J Am Board Fam Med* 2011; 24:218-19[PMID:21383224]
21. Gupta A, Priya B, Williams J, et al. Intra-household evaluations of alcohol abuse in men with depression and suicide in women: A cross-sectional community-based study in Chennai, India. *BMC Public Health* 2015; 15:636. doi:10.1186/s12889-015-1864-5.