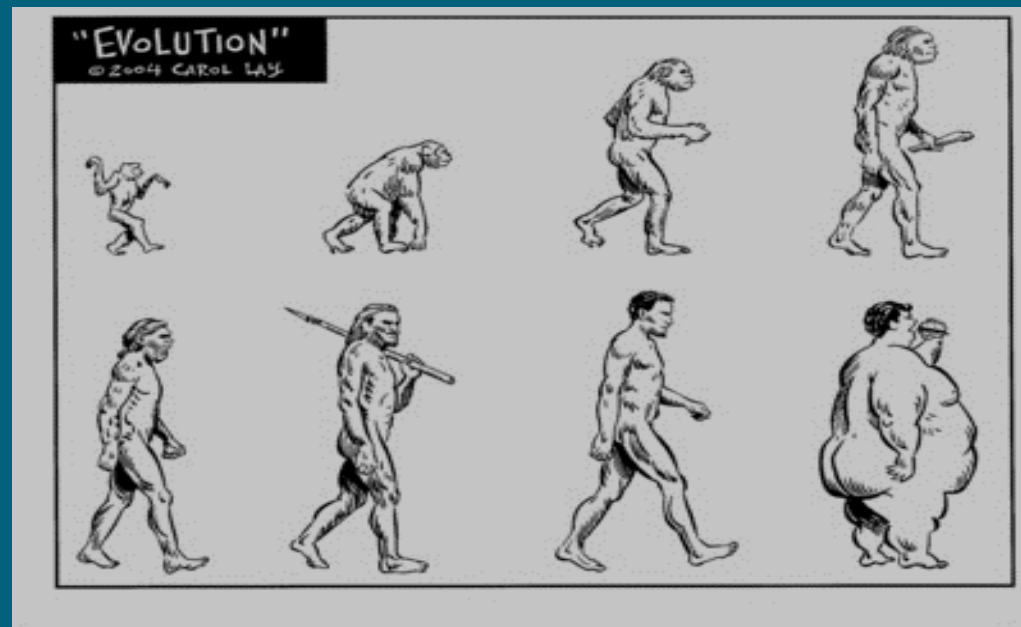


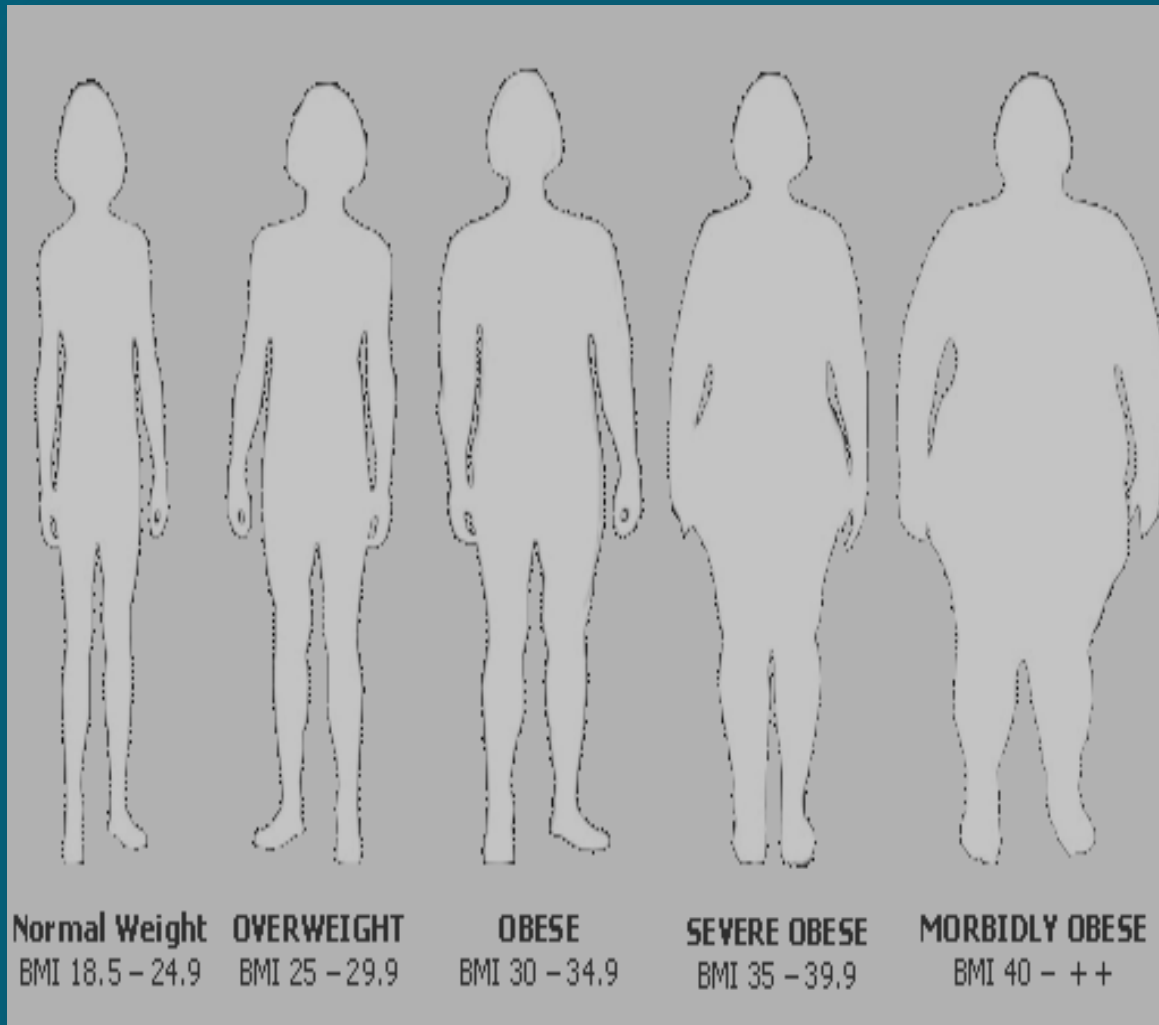


Presented by:  
Dr. Hina Vaish (PT)  
MPT (Cardiopulmonary)  
Assistant Professor,  
SCMAT, Kanpur

Obesity is defined as the abnormal growth of adipose tissue due to enlargement of fat cell size (hypertrophic obesity) or an increase in fat cell number (hyperplastic obesity) or a combination of both.



# CLASSIFICATION



- $WHR > 0.95$  for men and  $> 0.80$  for women :  $\uparrow$  risk
- $WC > 102\text{cm}$  in men and  $> 88\text{cm}$  in women :  $\uparrow$  risk.

- World health report. 2014
- Doukteis JD. Body weight classification. CMAJ 2005;172:995

# TRENDS IN ASIA

BMI kg/m <sup>2</sup>	CATEGORY
<18.4	UNDERWEIGHT
18.5-22.9	NORMAL
23-24.9	OVERWEIGHT
<b>&gt;25</b>	<b>OBESE</b>

↑ risk if waist circumference

- WC>90cm for men
- WC>80cm for women

- Prevention and Management of Obesity and Metabolic Syndrome for the country. October 2008. The guidelines were released jointly by the Health Ministry, the Diabetes Foundation of India, the AIIMS, the ICMR, the National Institute of Nutrition and 20 other health organizations.
- Misra A , Chowbey P, Makkar B. Consensus statement for diagnosis of obesity, abdominal obesity, and metabolic syndrome, for Asian Indians and recommendations for physical activity, medical and surgical management. *JAPI*. 2009;57:163-170.v

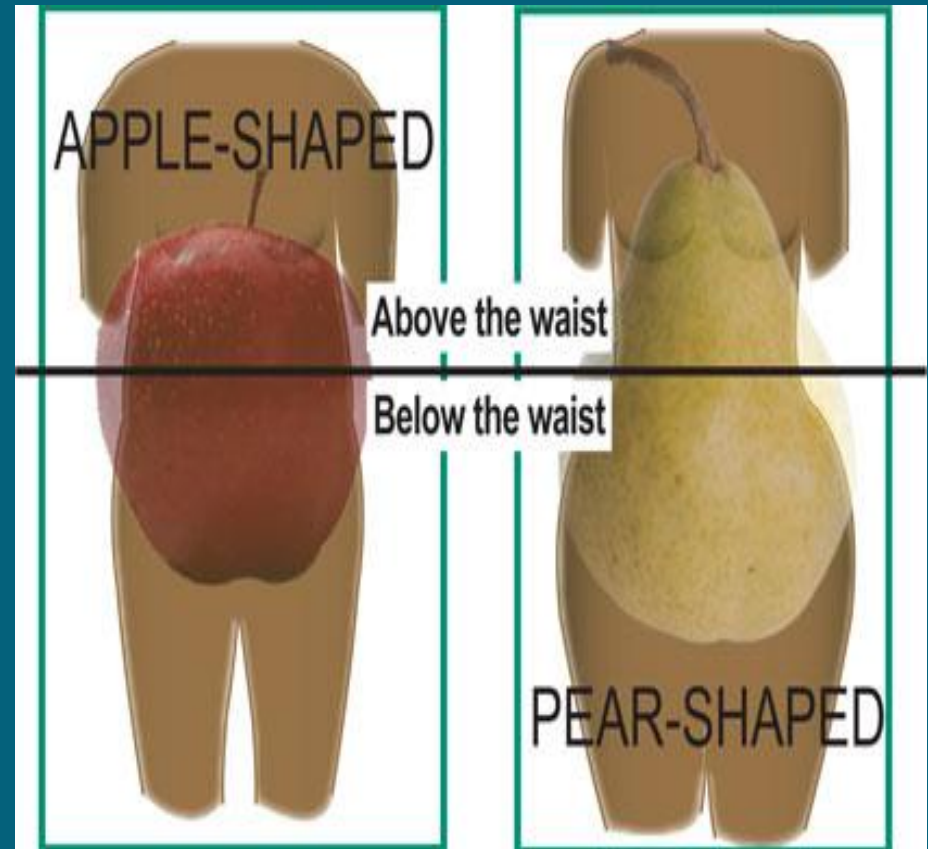
# REGIONAL FAT DISTRIBUTION

## CENTRAL OR ANDROID TYPE

- In men twice as compared to women.

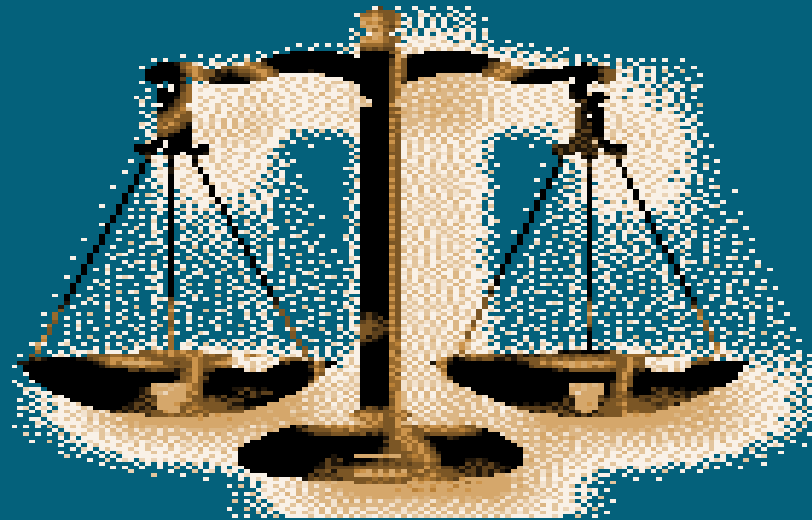
## PERIPHERAL OR GYNOID TYPE.

- More in women.



- June M Chan ,Eric B Rimm, Graham A Colditz, Meir J Stampfer,Walter C Willett. Obesity, Fat Distribution, and Weight Gain as Risk Factors for Clinical Diabetes in Men. *Diabetes Care* September 1994 ;17 :61-969
- Patrick Mathieu, Paul Poirier, Philippe Pibarot, Isabelle Lemieux and Jean-Pierre. Visceral Obesity : The Link Among Inflammation, Hypertension, andCardiovascular Disease. *Hypertension* 2009, 53:577-584:

↑ ENERGY INTAKE ↓ ENERGY  
EXPENDITURE

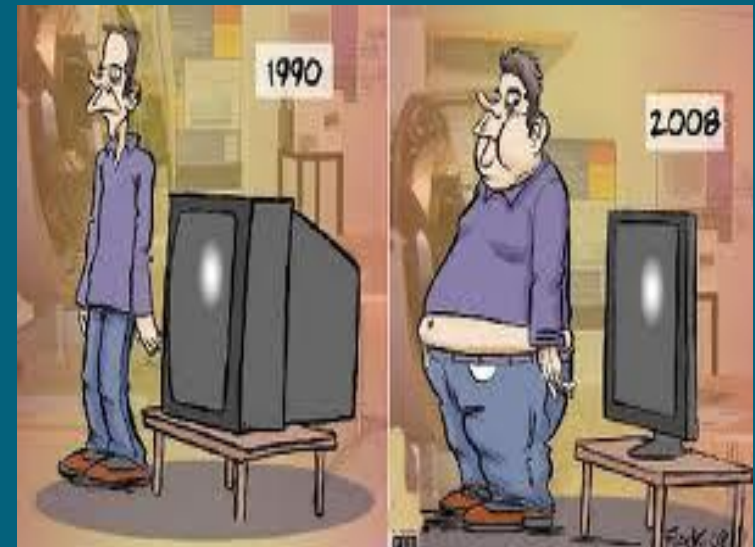


Energy balance is like a scale. When calories consumed are greater than calories used, weight gain is the result

# THE OBSOGENIC ENVIRONMENT



"I try to eat healthy. I never sprinkle salt on ice cream, I only eat decaffeinated pizza and my beer is 100% fat-free."



# EFFECTS

## ❖ HEART

- Hypertension
- Coronary heart disease
- Hypercholesterolemia

## ❖ ENDOCRINOLOGY

- Type 2 Diabetes

## ❖ NEUROLOGY

- Stroke

## ❖ Rheumatology and Orthopedics

- Gout, OA
- low back pain

- Raheena Beegom , Razia Beegom, Mohammad A. Niaz , Ram B. Singh. Diet, central obesity and prevalence of hypertension in the urban population of South India. *International Journal of Cardiology*. 1995;51:2 :183-191
- Robert H. Eckel, MD; ; For the Nutrition Committee Obesity and Heart Disease . A Statement for Healthcare Professionals From the Nutrition Committee, American Heart Association. *Circulation*. 1997;96:3248-3250
- Haslam DW, James WP (2005). "Obesity". *Lancet* 366 (9492): 1197–209.
- Seuung Hansuk, Ralph L. Sacco, Bernadette Boden-Albala, Jian F. Cheun, John G. Pittman et al. Abdominal obesity and risk of ischaemic stroke. *Stroke*. 2003;34:1586-1592.



## ❖ RESPIROLOGY

- Obstructive sleep apnea
- Obesity hypoventilation syndrome
- ↑ complications during GA
- Asthma

## ❖ ONCOLOGY

- Breast, Ovarian, Esophageal, Colorectal, Liver, pancreatic, Gallbladder, Stomach, Endometrial, cervical, Prostate, Kidney

## ❖ NEPHROLOGY

- Chronic renal failure

- Surendra Kumar Sharma, Saket Kumpawat, Amit Banga, Ashish Goel. Prevalence and Risk Factors of Obstructive Sleep Apnea Syndrome in a Population of Delhi, India. *Chest* 2006;130;149-156
- Jean L. Holley, Ron Shapiro, William B. Lopatin, Andreas G. Tzakis, Thomas R. Hakala, Thomas E. Starzl. Obesity as a risk factor following cadaveric renal transplantation. *Transplantation*. 1990 : 49(2): 387–389
- Calle EE, Rodriguez C, Walker-Thurmond K, Thun MJ "Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults". *N. Engl. J. Med.* 2003;348 (17): 1625–38.

# OBESITY AND SKIN DISEASES

- Acanthosis Nigricans
- Friability of skin and varicosities
- Aggravation of other conditions caused by Diabetes Mellitus



# OBESITY AND PSYCHOLOGICAL PROBLEMS

Are obese people more jolly?

**NO**

- 50% overweight people lack self confidence
- Depression
- Lack of attention
- Low self esteem
- Social stigmatization

# HIGH PREVALENCE OF METABOLIC SYNDROME

- Hypertension
- Increased Insulin Resistance
- Central Obesity
- Dyslipidemia

# OBESITY IN WOMEN

- 3 times more likely to have menstrual disturbances
- Face more complications during pregnancy
- Higher maternal and perinatal complications and mortality
- More difficult to conceive.
- Risk of endometrial cancer is increased by 2-3 times and if very obese increased by 6 times.



Susan Y. Chu, William M. Callaghan, Shin Y. Kim, Christopher H. Schmid, Joseph Lau et.al. Maternal Obesity and Risk of Gestational Diabetes Mellitus . Diabetes Care 2007 Aug; 30(8): 2070-2076.

# OBESITY IN WOMEN

- Higher rates of abortion
- Increased risk of C-section
- Obesity has more risk of depression in Women
- Increase in abdominal obesity and so waist size Women 88cm/ 34ins increases the risk of 3 fold increase in type 2 Diabetes Mellitus.

# IS OBESE WOMEN AT RISK OF INFERTILITY?

## YES

**An obese woman is about thrice as likely  
to be infertile as a normal woman.**

# OBESITY: GLOBAL EPIDEMIC

- Overweight and obesity are the fifth leading risk for global deaths.
- **Worldwide obesity has nearly tripled since 1975.**
- In 2016, more than 1.9 billion adults, 18 years and older, were overweight. Of these over 650 million were obese.
- 39% of adults aged 18 years and over were overweight in 2016, and 13% were obese.
- Over 340 million children and adolescents aged 5-19 were overweight or obese in 2016.

- Barness LA, Opitz JM, Gilbert-Barness E . "Obesity: genetic, molecular, and environmental aspects". Am. J. Med. Genet. 2007;**143** (24): 3016–34.
- World Health Organization (WHO). Obesity and Overweight factsheet from the WHO. Health. 2017 Oct 24.



# OBESITY: WEIGHT OF THE NATION



More than 50% of the 693 million obese individuals in the world live in just 10 countries (listed in order of number of obese individuals): USA, China, India, Russia, Brazil, Mexico, Egypt, Pakistan, Indonesia, and Germany).

# OBESITY: THE CAUSE OF THE SILENT KILLER?

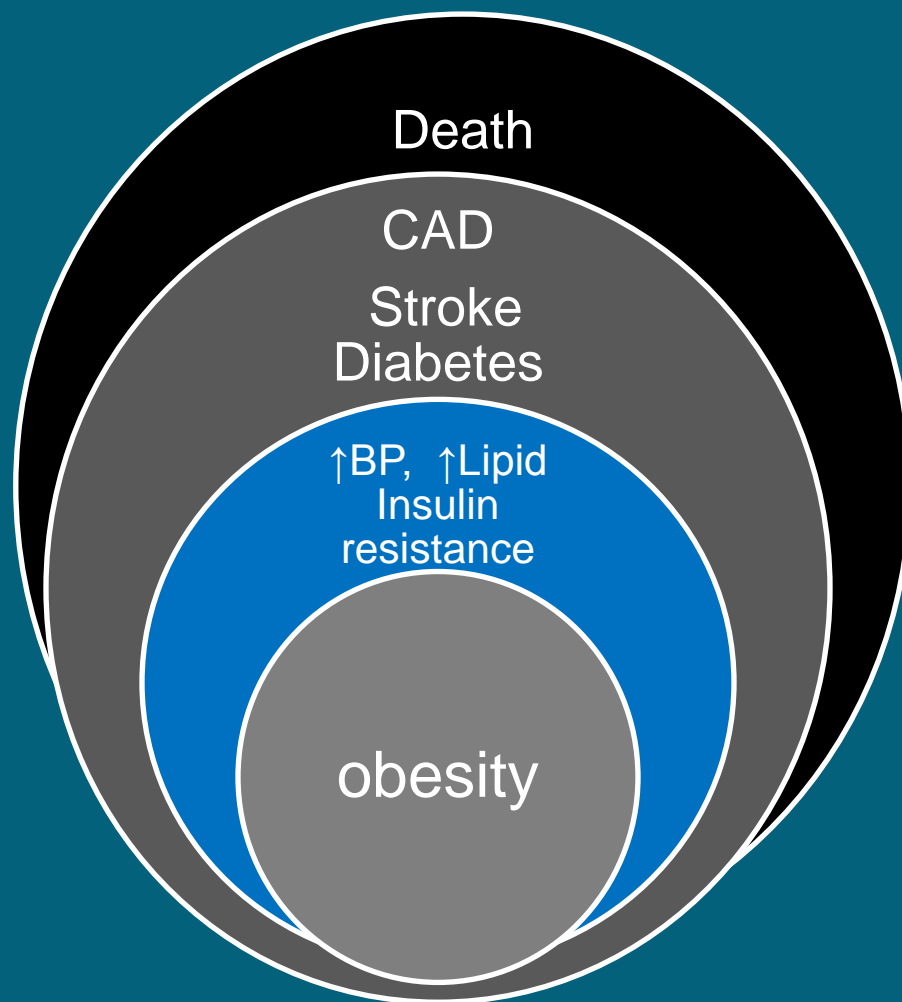
- At least 2.8 million adults die each year as a result of being overweight or obese.
- Over 75% of hypertension cases are reported to be directly attributed to obesity.
- 44% of diabetes burden, 23% of IHD burden and 7%- 41% of certain cancer burdens are attributable to overweight and obesity.

- WHO: Global strategy on diet, physical activity and health. 2003
- Sola Ogundipe and Chioma Obinna Obesity: An underestimated 'silent killer' *Vanguard* October 17, 2010 · *Special Report*

# OBESITY: THE CAUSE OF THE SILENT KILLER?

- Mortality risk is lowest at a BMI of 20–25 kg/m<sup>2</sup> in non-smokers with risk increasing along with changes in weight.
- 83% of people with serious mental illness being overweight or obese.

- Flegal KM, Graubard BI, Williamson DF, Gail MH. Excess deaths associated with underweight, overweight, and obesity. *JAMA* 2005 Apr 20;293(15):1861-7.
- Whitlock G, Lewington S, Sherliker P, *et al.* (March 2009). "Body-mass index and cause-specific mortality in 900 000 adults: collaborative analyses of 57 prospective studies" *Lancet* **373** (9669): 1083–96.
- Barness LA, Opitz JM, Gilbert-Barness E "Obesity: genetic, molecular, and environmental aspects". *Am. J. Med. Genet.* 2007 **143A** (24): 3016–34.
- Berrington de Gonzalez A, Hartge P, Cerhan JR, *et al.* "Body-mass index and mortality among 1.46 million white adults". *N. Engl. J. Med.* 2010 **363** (23): 2211–9.
- Pischon T, Boeing H, Hoffmann K, *et al.* "General and abdominal adiposity and risk of death in Europe". *N. Engl. J. Med.* 2008 **359** (20): 2105–20.
- Holt, R., Peveler, R. Obesity, Serious Mental Illness and Antipsychotic Drugs, *Diabetes, Obesity and Metabolism* 2009; 11(7): 665-679.



- WHO Tech Pep Ser. 2009:706:44
- National Association of State Mental Health Program Directors. Obesity and Prevention Strategies for Individuals with Serious Mental Illness, Technical Report. 2008.
- Hoffmann, V., Ahl, J. Meyers, A., Schuh, L. Shults, K. Collins, D, and Jensen, L. Wellness Intervention for Patients with Serious and Persistent Mental Illness, Journal of Clinical Psychiatry, 2005: 66(12): 1576-1579.

# OBESITY: THE CAUSE OF THE SILENT KILLER?

- BMI >32 :doubled mortality rate among women over a 16-year period.
- On average, obesity reduces life expectancy by 6-7years :a BMI of 30–35 reduces life expectancy by 2-4years, a BMI > 40 reduces life expectancy by 10 years.
- Manson JE, Willett WC, Stampfer MJ, et al. "Body weight and mortality among women". *N. Engl. J. Med.* 2005;**333** (11): 677
- Haslam DW, James WP (2005). "Obesity". *Lancet* **366** (9492): 1197–209
- Peeters A, Barendregt JJ, Willekens F, Mackenbach JP, Al Mamun A, Bonneux L "Obesity in adulthood and its consequences for life expectancy: A life-table analysis". *Ann. Intern. Med.* 2003.**138** (1): 24–32
- G, Lewington S, Sherliker P, et al. "Body-mass index and cause-specific mortality in 900 000 adults: collaborative analyses of 57 prospective studies" 2009.*Lancet* **373** (9669): 1083–96.

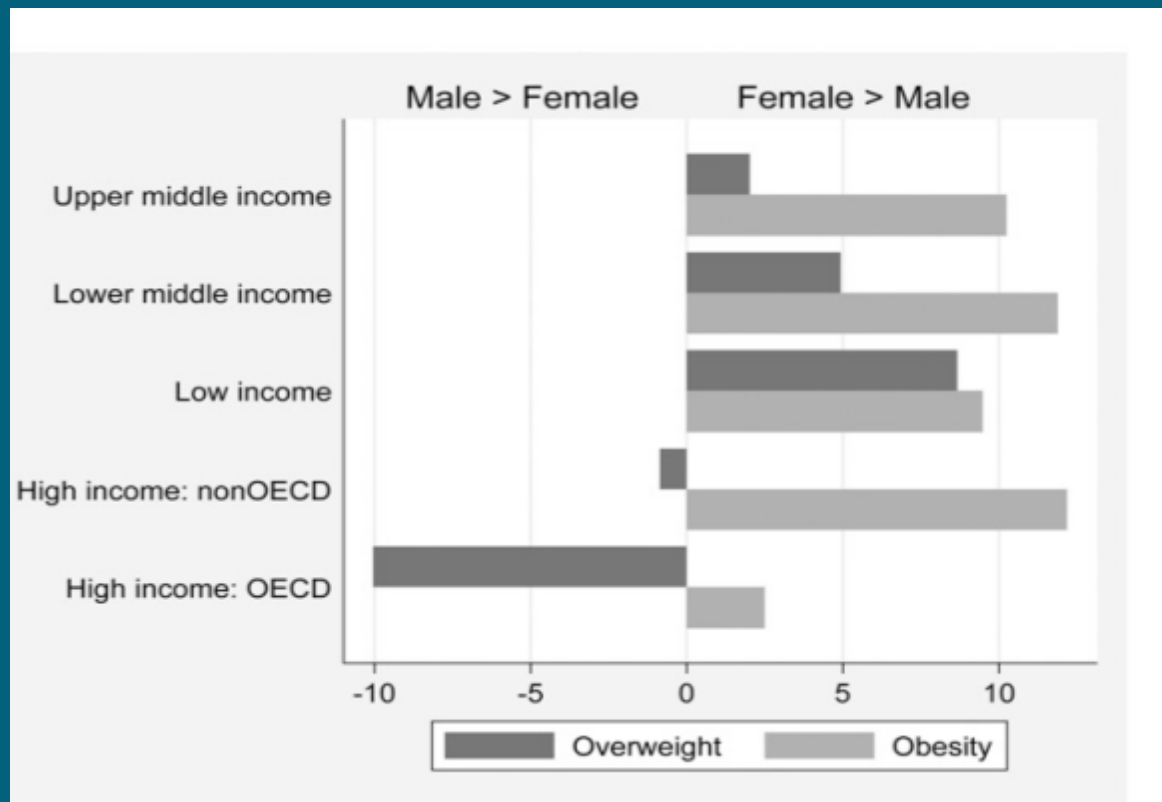
# OBESITY IS MORE HARMFUL TO THE HEART THAN SMOKING

- **Heart attacks attack obese more than a decade sooner**

# OBESITY: GENDER DISPARITIES

- Globally, the proportion of adults with a BMI of 25 or greater increased from  
**28.8% in 1980 to 36.9% in 2013 for men**  
**29.8% to 38.0% in 2013 for women**
- Health survey in England 2010-12 reported that men were more overweight and women were more obese

# OBESITY: GENDER DISPARITIES

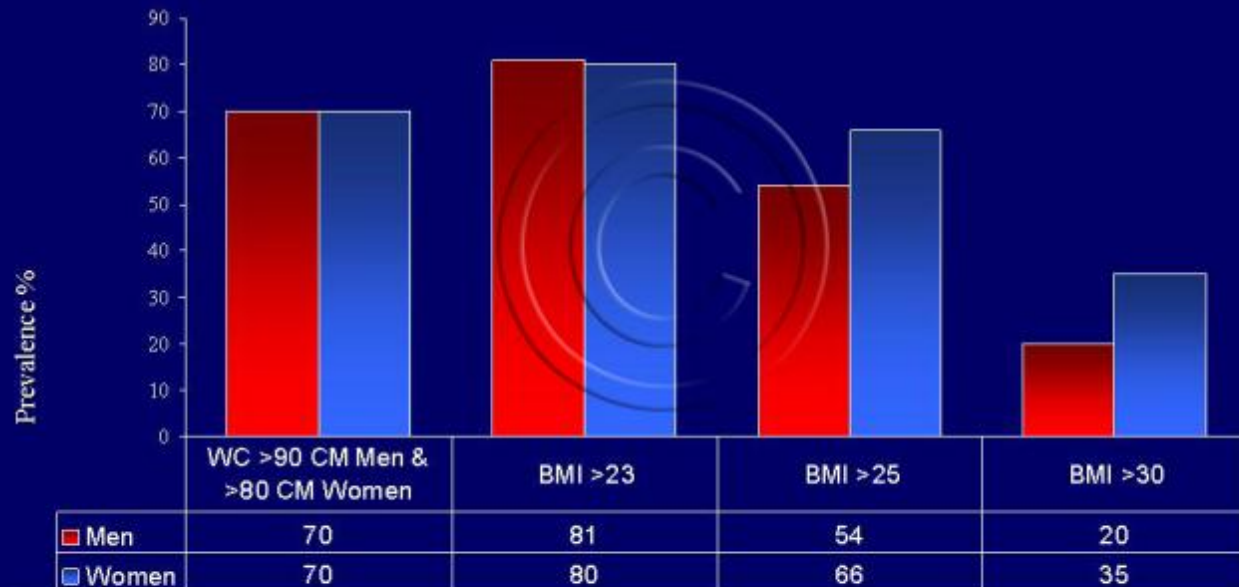


Rebecca Kanter, and Benjamin Caballero . Global Gender Disparities in Obesity: A Review .Adv. Nutr. 2012; 3: 491–498,



# OBESITY: GENDER DISPARITIES

Differences in the Prevalence (%) of Obesity and Abdominal Obesity in Young Adults (age 36) using Different Criteria in the New Delhi Birth Cohort



Huffman, JAAC 2011, 57:1765

# OBESITY: GENDER DISPARITIES

States	Male (%)	Male rank	Female (%)	Female rank
Punjab	30.3	1	37.5	1
Kerala	24.3	2	34	2
Goa	20.8	3	27	3
Tamil Nadu	19.8	4	24.4	4
Andhra Pradesh	17.6	5	22.7	10
Sikkim	17.3	6	21	8
Mizoram	16.9	7	20.3	17
Himachal Pradesh	16	8	19.5	12
Maharashtra	15.9	9	18.1	13
Gujarat	15.4	10	17.7	7
Haryana	14.4	11	17.6	6
Karnataka	14	12	17.3	9
Manipur	13.4	13	17.1	11
India	12.1	14	16	15
Uttarakhand	11.4	15	14.8	14
Arunachal Pradesh	10.6	16	12.5	19
Uttar Pradesh	9.9	17	12	18
Jammu and Kashmir	8.7	18	11.1	5
Bihar	8.5	19	10.5	29
Nagaland	8.4	20	10.2	22
Rajasthan	8.4	20	9	20
Meghalaya	8.2	22	8.9	26
Orissa	6.9	23	8.6	25
Assam	6.7	24	7.8	21
Chattisgarh	6.5	25	7.6	27
West Bengal	6.1	26	7.1	16
Madhya Pradesh	5.4	27	6.7	23
Jharkhand	5.3	28	5.9	28
Tripura	5.2	29	5.3	24

THIS ONE  
RUNS ON FAT  
AND SAVES YOU MONEY

THIS ONE  
RUNS ON MONEY  
AND MAKES YOU FAT



**Obesity  
prevention  
and control**

# CURRENT THERAPEUTIC APPROCHES

BMI classification	Waist circumference			Comorbidities present
	Low	High	Very high	
Overweight	Black	Light Green	Light Green	Green
Obesity I	Light Green	Light Green	Light Green	Green
Obesity II	Green	Green	Green	Green
Obesity III	Purple	Purple	Purple	Purple



General advice on healthy weight and lifestyle

Diet and physical activity

Diet and physical activity; consider drugs

Diet and physical activity; consider drugs; consider surgery

- NICE clinical guideline 43 . Obesity: guidance on the prevention, identification, assessment and management of overweight and obesity in adults and children . 2006
- Obesity: preventing and managing the global epidemic Report of a WHO Consultation (WHO Technical Report Series ) 2012
- Michael D Jensen et al. AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults. Circulation 2013

# EXERCISE TESTING

- Exercise protocols that increase workloads at 0.5-1 MET each minute or ramp protocol.
  - Treadmill test or Cycle ergometry (big seats)
- 
- American College of Sports Medicine. Position Stand. Appropriate intervention strategies for weightloss and prevention of weight regain for adults. *Med Sci Sports Exerc.* 2001;33:2145–56.
  - ACSM “Appropriate Physical Activity Intervention Strategies for Weight Loss and Prevention of Weight Regain for Adults,” *Medicine & Science in Sports & Exercise.* 2010
  - Gillman, and David S. Ludwig, How early should obesity prevention start? *N Engl J Med* 2013; 369:2173-2175

# PRINCIPLE OF WEIGHT CONTROL

- Reduce initial body weight by 5-15%.
- Start slowly and progress gradually.
- Calorie restraint + exercise: the ideal combination.

- Kam S. Woo Ping Chook , Chung W. Yu, Rita Y.T. Sung , Mu ,Qiao, Sophie S.F. Leung, Christopher W.K. Lam, Con Metreweli, David S. Effects of Diet and Exercise on Obesity-Related Vascular Dysfunction in Children *Circulation. 2004; 109: 1981-1986*
- ACSM “Appropriate Physical Activity Intervention Strategies for Weight Loss and Prevention of Weight Regain for Adults,” *Medicine & Science in Sports & Exercise. 2010*
- Michael D Jensen et al. AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults. *Circulation 2013*

## ❖ AEROBIC TRAINING

- Ideal exercise consists of continuous large muscle activity with high to moderate calorie cost such as circuit training, running, walking, skipping, stair climbing, cycling and swimming.
- Endurance training reduce % body fat from reduced fat mass

- Ross E. Andersen Thomas A. Wadden, Susan J. Bartlett Babette Zemel, Tony J. Verde, Shawn C. Franckowiak. Effects of Lifestyle Activity vs Structured Aerobic Exercise in Obese Women. JAMA. 1999;281(4):335-340
- Kam S. Woo, Ping Chook, Chung W. Yu, Rita Y.T. Sung, Mu Qiao et. al. Effects of Diet and Exercise on Obesity-Related Vascular Dysfunction in Children. Circulation. 2004; 109: 1981-1986
- ACSM “Appropriate Physical Activity Intervention Strategies for Weight Loss and Prevention of Weight Regain for Adults,” Medicine & Science in Sports & Exercise. 2010
- Michael D Jensen et al. AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults. Circulation 2013

## •INTENSITY

- ✓ Moderate to vigorous intensity physical activity
- ✓ Initial intensity -40%– 60%  $\text{VO}_2\text{R}$  or HRR.
- ✓ Progression to 50%–75%  $\text{VO}_2\text{R}$  or HRR.

## •EXERCISE FREQUENCY

- ✓ 3-5d.wk-1

- American College of Sports Medicine. Position Stand. Appropriate intervention strategies for weightloss and prevention of weight regain for adults. *Med Sci Sports Exerc.* 2001;33:2145–56.
- American College of Sports Medicine. Position Stand. The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness and flexibility in adults. *Med Sci Sports Exerc.* 1998;30:975–91
- ACSM “Appropriate Physical Activity Intervention Strategies for Weight Loss and Prevention of Weight Regain for Adults,” *Medicine & Science in Sports & Exercise.* 2010
- Michael D Jensen et al. AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults. *Circulation* 2013



# DURATION

- 30–60 min·d<sup>-1</sup> to total 150 min/week, progressing to 300 min/week of moderate physical activity; 150 min/week of vigorous physical activity; or an equivalent combination of both.
- Intermittent exercise of at least 10 min in duration; accumulating these duration is an effective alternative to continuous exercise.
- ACSM “Appropriate Physical Activity Intervention Strategies for Weight Loss and Prevention of Weight Regain for Adults,” *Medicine & Science in Sports & Exercise*. 2010
- Michael D Jensen et al. AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults. *Circulation* 2013

## ❖ RESISTANCE TRAINING

- Decreases body fat mass and increase the FFM.
- This exercise mode burns substantial calories during a typical 30-60min workout.
- Reduces CHD, improves glycemic control, modifies the lipoprotein profile, and increases resting metabolic rate.

- Gary R. Hunter ,Nuala M. Byrne , Bovorn Sirikul , José R. Fernández, Paul A. Zuckerman et.al. Resistance Training Conserves Fat-free Mass and Resting Energy Expenditure Following Weight Loss. *Obesity* (2008) 16 5, 1045–1051.
- ACSM “Appropriate Physical Activity Intervention Strategies for Weight Loss and Prevention of Weight Regain for Adults,” *Medicine & Science in Sports & Exercise*. 2010
- Michael D Jensen et al. AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults. *Circulation* 2013

- **FREQUENCY**

Resistance training of each major muscle group 2–3 d·wk<sup>-1</sup> with at least 48 hours separating the exercise training sessions for the same muscle group.

- **VOLUME**

- ✓ Start with 30-50% OF 1 RM for upper limb .

- ✓ 50-60% of 1 RM for lower limb.

- ✓ Progress upto 8 -12 repetitions per set

- American College of Sports Medicine. Position Stand. Progression models in resistance training for healthy adults. *Med Sci Sports Exerc.* 2002;34:364–80.
- ACSM “Appropriate Physical Activity Intervention Strategies for Weight Loss and Prevention of Weight Regain for Adults,” *Medicine & Science in Sports & Exercise.* 2010
- Michael D Jensen et al. AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults. *Circulation* 2013

# HOW MUCH PHYSICAL ACTIVITY IS ENOUGH?

- Prevention -150-250 minutes/week of moderate-intensity physical activity
- Weight loss >250 minutes/week of moderate-intensity physical activity
- Prevent weight re-gain >250 minutes/week of moderate-intensity physical activity.

- ACSM “Appropriate Physical Activity Intervention Strategies for Weight Loss and Prevention of Weight Regain for Adults,” *Medicine & Science in Sports & Exercise*. 2010
- Gillman, and David S. Ludwig, How early should obesity prevention start? *N Engl J Med* 2013; 369:2173-2175
- World Health Organization (WHO). Obesity and Overweight factsheet from the WHO. *Health*. 2017 Oct 24.

# KEY MESSAGE

- **Obesity is no laughing matter.**
- Obesity is a new **“silent killer”**.
- Mortality rate of physically active obese is less than physically inactive lean individuals.
- Regular exercise can help reduce body fat as well as protect against chronic diseases associated with obesity.
- **EAT WELL, MOVE MORE , LIVE LONGER**

change  
4 life

THANK YOU