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Controlling way of weight by knowing BMI AND BMR

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Abstract

The purpose of this study is to intimae the students and general people regarding the way of weight control. In modern era the amount of daily physical work is decreasing day by day because the information technology is developed extensively. As a result we are cordially inviting some hypo kinetic diseases like obesity, high blood pressure etc. In busy schedule of human there has no enough scope to do some physical activity daily. So we have to know about our BMI and BMR to control our physical status and weight by doing at least some exercises and taking proper diet as per body weight.

KEYWORDS: weight control, BMI, BMR, physical activity

INTRODUCTION

In recent trends, people perform physical activity to keep them healthy and fit. Maximum of people perform the physical activity without knowing actual amount of work will be suited for them. As a result, the aim of exercise is not fulfilled. Everyone should know about the physical activity level, BMI, BMR and total daily energy requirements for being properly fit and healthy. Besides these, life style is a factor for calculating the mentioned criterion. Therefore, everyone should know that which life style he/she belongs.

OBJECTIVE OF THE STUDY

Following are the main objectives of the study

1. To create knowledge about the significance of BMI AND BMR and related terms.
2. To explore the concept regarding BMI AND BMR and its role in weight lose.

Methods:

BODY MASS INDEX:

Body mass index (BMI) is a measure of body fat based on height and weight that applies to adult men and women. Body Mass Index (BMI) is a relationship between weight and height that is associated with body fat and health risk.

The **body mass index** (**BMI**), or **Quetelet index**, is a heuristic proxy for human body fat based on an individual's weight and height. BMI does not actually measure the percentage of body fat. Body mass index is defined as the individual's body mass divided by the square of his or her height.

The formula for calculating BMI is weight in kilograms (kg) divided by height in meters (m) squared.

Metric Imperial BMI Formula

The metric BMI formula accepts weight measurements in kilograms & height measurements in either cm's or meters.

1 meter = 100 cms

meters² = meters × meters

$$\text{BMI (kg/m}^2\text{)} = \frac{\text{weight in kilograms}}{\text{height in meters}^2}$$

Health Risk Classification According to Body Mass Index (BMI)

Classification	Categories	Risk of developing health problems
Underweight	< 18.5	Increased
Normal Weight	18.5 - 24.9	Least
Overweight	25.0 - 29.9	Increased
Obese class I	30.0 - 34.9	High
Obese class II	35.0 - 39.9	Very high
Obese class III	>= 40.0	Extremely high

Note: For persons 65 years and older the 'normal' range may begin slightly above BMI 18.5 and extend into the 'overweight' range

BMI is equal to or less than 18.5 (Underweight)

A lean BMI can indicate that your weight maybe too low. You should consult your physician to determine if you should gain weight, as low body mass can decrease your body's immune system, which could lead to illness.

BMI is between 18.5 and 24.9 (Normal)

People whose BMI is within 18.5 to 24.9 possess the ideal amount of body weight, associated with living longest, the lowest incidence of serious illness, as well as being perceived as more physically attractive than people with BMI in higher or lower ranges.

BMI is between 25 and 29.9 (Overweight)

People falling in this BMI range are considered overweight and would benefit from finding healthy ways to lower their weight, such as diet and exercise. Individuals who fall in this range are at increased risk for a variety of illnesses.

BMI is over 30 (Obese)

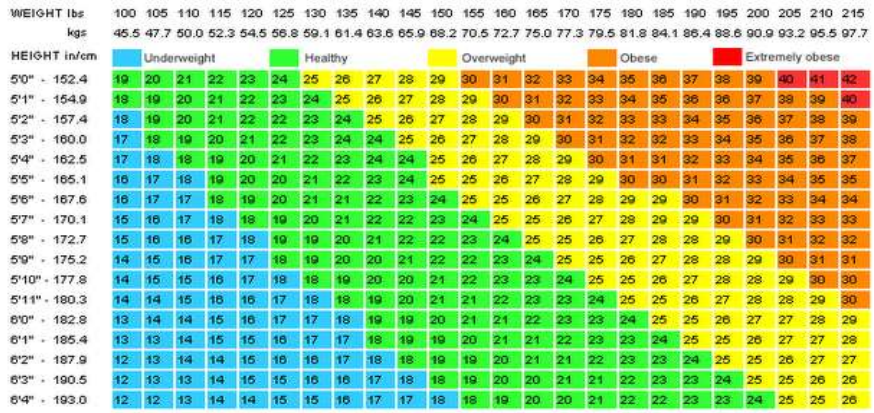
Individuals with a BMI over 30 are in a physically unhealthy condition, which puts them at risk for serious illnesses such as heart disease, diabetes, high blood pressure and some cancers. These people would benefit greatly by modifying their lifestyle.

Advantages of BMI

- BMI is generally considered the best way to determine if an individual is at a healthy weight. Using BMI is popular because it is simple, quick, effective and applies to adult men and women, as well as children. BMI is a useful tool for quickly assessing weight classification. While it does not directly measure body fat, it is more accurate at approximating degree of body fatness than weight alone. In addition, you do not have to be of an exact weight or measurement, to be considered 'normal.' There is a range within each classification to allow for different body types and shapes. For example, you can be 40 TO 50 Kg heavier than a same height counterpart and still fall within a normal weight range.
- Implement appropriate strategies to manage and prevent obesity on a population basis worldwide.
- Develop policy recommendations for a coherent and effective global approach to the management and prevention of obesity.
- Simple, quick, effective and applies to adult men and women, as well as children
- A useful tool for quickly assessing weight classification.

One thing is important to keep in mind. BMI should not be used for pregnant women and the elderly and children, and its use is unnecessary for bodybuilders and athletes. The main reason for this is that it doesn't calculate accurately in all cases, because BMI doesn't distinguish between muscle and fat

BMI CHART



WEIGHT lbs	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215
kgs	45.5	47.7	50.0	52.3	54.5	56.8	59.1	61.4	63.6	65.9	68.2	70.5	72.7	75.0	77.3	79.5	81.8	84.1	86.4	88.6	90.9	93.2	95.5	97.7
HEIGHT in/cm	Underweight						Healthy					Overweight				Obese					Extremely obese			
5'0" - 152.4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
5'1" - 154.9	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	36	37	38	39	40
5'2" - 157.4	18	19	20	21	22	22	23	24	25	26	27	28	29	30	31	32	33	33	34	35	36	37	38	39
5'3" - 160.0	17	18	19	20	21	22	23	24	24	25	26	27	28	29	30	31	32	32	33	34	35	36	37	38
5'4" - 162.5	17	18	18	19	20	21	22	23	24	24	25	26	27	28	29	30	31	31	32	33	34	35	36	37
5'5" - 165.1	16	17	18	19	20	20	21	22	23	24	25	25	26	27	28	29	30	30	31	32	33	34	35	35
5'6" - 167.6	16	17	17	18	19	20	21	21	22	23	24	25	25	26	27	28	29	29	30	31	32	33	34	34
5'7" - 170.1	15	16	17	18	18	19	20	21	22	22	23	24	25	25	26	27	28	29	29	30	31	32	33	33
5'8" - 172.7	15	16	16	17	18	19	19	20	21	22	22	23	24	25	25	26	27	28	28	29	30	31	32	32
5'9" - 175.2	14	15	16	17	17	18	19	20	20	21	22	22	23	24	25	25	26	27	28	28	29	30	31	31
5'10" - 177.8	14	15	15	16	17	18	18	19	20	20	21	22	23	23	24	25	25	26	27	28	28	29	30	30
5'11" - 180.3	14	14	15	16	16	17	18	18	19	20	21	21	22	23	23	24	25	25	26	27	28	28	29	30
6'0" - 182.8	13	14	14	15	16	17	17	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27	28	29
6'1" - 185.4	13	13	14	15	15	16	17	17	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27	28
6'2" - 187.9	12	13	14	14	15	16	16	17	18	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27
6'3" - 190.5	12	13	13	14	15	15	16	16	17	18	18	19	20	20	21	21	22	23	23	24	25	25	26	26
6'4" - 193.0	12	12	13	14	14	15	15	16	17	17	18	18	19	20	20	21	22	22	23	23	24	25	25	26

PHYSICAL ACTIVITY AND CONTROLLING WEIGHT

The Key to Weight Control: A simple equation of calories in minus calories out. This means to simply subtract the calories you've expended throughout the day from the ones you took in. But there is a little more to it than just that. The biggest piece of the puzzle is to understand what makes up your Total Energy Expenditure (see below).

Beware of Fad Diets: Don't let the media or any other source determine how or what you eat. Just try to get enough servings from each of the food groups everyday and control your portion sizes! Eating frequent, small meals throughout the day will result in an overall higher basil metabolic rate, which is the amount of energy your body expends at rest.

BMR: Basal metabolic rate (BMR) (sometimes referred to as resting metabolic rate) is the total number of calories your body needs to perform essential, life-sustaining functions. These basal functions include circulation, breathing, cell production, nutrient processing, protein synthesis, and ion transport. You can calculate the basal metabolic rate using a mathematical formula.

Use BMR to Lose Weight

Once you understand BMR and get a reasonable estimate of your number, you can use it to help you reach or maintain a balanced weight. First, you can try to increase your basal metabolic rate; then, you can increase the total number of calories you burn each day to help you reach your goal.

Total Daily Energy Expenditure

Various national and international Committees have recommended allowances for different nutrients and the total calorie needs for different age groups with different

activity levels like the Human nutritional requirements, FAO /WHO; Food and Nutrition Board, National Research Council USA; Nutrition Expert Committee I.C.M.R India etc are some of them

The Harris-Benedict formula is based on total body weight, height, age, and sex and is therefore more accurate than the "quick and easy" formula used above.

Men: BMR = 66 + (13.7 × wt in kg) + (5 × ht in cm) - (6.8 × age in years)

Women: BMR = 655 + (9.6 × wt in kg) + (1.8 × ht in cm) - (4.7 × age in years)

*Note: 1 inch = 2.54 cm and 1 kilogram = 2.2 lbs.

The revised H&B equations for males and females (2) are:

Men: 88.362 + (13.397 × weight in kg) + (4.799 × height in cm) - (5.677 × age in years)

Women: 447.593 + (9.247 × weight in kg) + (3.098 × height in cm) - (4.330 × age in years)

MIFFLIN-ST JEOR EQUATION

The Mifflin-St Jeor equation, created in the 1990s, provided an alternative and more valid estimate of RMR (3).

The equations for males and females are:

Men: (10 × weight in kg) + (6.25 × height in cm) - (5 × age in years) + 5

Women: (10 × weight in kg) + (6.25 × height in cm) - (5 × age in years) - 161

Method	Category	Formula	Height cm	Weight kg	Age years	BMR Kcal
Harris-Benedict	Men	66 + (13.7 × wt in kg) + (5 x ht in cm) - (6.8 × age in years)	162	50	40	=66+(13.7 × 50) +(5 × 162)- (6.8 × 40)=1254
	Women	655 + (9.6 × wt in kg) + (1.8 × ht in cm) - (4.7 × age in years)	160	50	30	1282
Revised Harris-Benedict	Men	88.362 + (13.397 × weight in kg) + (4.799 × height in cm) - (5.677 × age in years)	162	50	40	=88.362 + (13.397 × 50) + (4.799 × 162) - (5.677 × 40) =1308.57

<table>
<tr><td></td><td>Women</td><td>447.593 + (9.247 × weight in kg) + (3.098 × height in cm) - (4.330 × age in years)</td><td>160</td><td>50</td><td>30</td><td>1275.723</td></tr>
<tr><td rowspan="2">MIFFLIN-ST JEOR EQUATION</td><td>Men</td><td>(10 × weight in kg) + (6.25 × height in cm) - (5 × age in years) + 5</td><td>162</td><td>50</td><td>40</td><td>(10 × 50) + (6.25 × 162) - (5 × 40) + 5=1317.5</td></tr>
<tr><td>Women</td><td>(10 × weight in kg) + (6.25 × height in cm) - (5 × age in years) - 161</td><td>160</td><td>50</td><td>30</td><td>1189</td></tr>
<tr><td rowspan="4">Katch-McArdle</td><td rowspan="2">Men</td><td rowspan="2">BMR = 370 + (21.6 * Lean Body Mass [kg])
The Boer Formula
LBM = 0.407 * Weight [Kg] + 0.267 * Height [Cm] - 19.2</td><td>162</td><td>50</td><td>N.A.</td><td></td></tr>
<tr><td colspan="3">Lean body Mass calculation:
LBM = (0.407 × 50) + (0.267 × 162) - 19.2 = 44.4 Kg.</td><td>BMR = 370 + (21.6 x 44.4) =1329.04</td></tr>
<tr><td rowspan="2">Women</td><td rowspan="2">BMR = 370 + (21.6 * Lean Body Mass [kg])
The Boer Formula
LBM = 0.252 * Weight [Kg] + 0.473 * Height [Cm] - 48.3</td><td>160</td><td>50</td><td>N.A.</td><td></td></tr>
<tr><td colspan="3">LBM =(0.252×50) + (0.473 ×160) - 48.3= 39.98</td><td>BMR = 370 + (21.6 x 39.98) =1233.57</td></tr>
</table>

Choose any formula of BMR, provided in above table to calculate your BMR.

Total Daily Energy Expenditure

TDEE is the total number of calories that your body expends in 24 hours, including all activities. It can vary widely in populations and is much higher for athletes or extremely active individuals. Caloric requirements may also vary among similarly active individuals due to differences in inherited metabolic rates.

Physical Activity Level

A person's Physical Activity Level (PAL) is defined as that person's total energy use over a 24 hour period divided by his or her basal metabolic rate.

Notes: It is convenient to consider both physical activity and metabolic rates over a specified period of 24 hours because activities including waking and sleeping tend to be repeated in 24 hour cycles. Therefore some definitions of Physical Activity Level specify: "*total energy required / used over 24 hours divided by basal metabolic rate over [the same] 24 hours*".

Equations for Physical Activity Level (PAL):

Simple equation for PAL:

$$\text{Physical Activity Level (PAL)} = \frac{Total\ Energy\ Expenditure}{Basal\ Metabolic\ Rate}$$

Energy requirement (per 24 hours) = Physical Activity Level × Basal Metabolic Rate

Scientific references to metabolism refer to the bodily processes needed to maintain life. But for most of us, it refers to total daily energy expenditure.

TDEE CALCULATION

TDEE=BMR /70%=1763 KCAL

	% OF TDEE	KCAL
TEF	10	176.4
TEPA	5	88.15
NEAT	15	264.45
BMR	70	1234
TOTAL=	100	1763

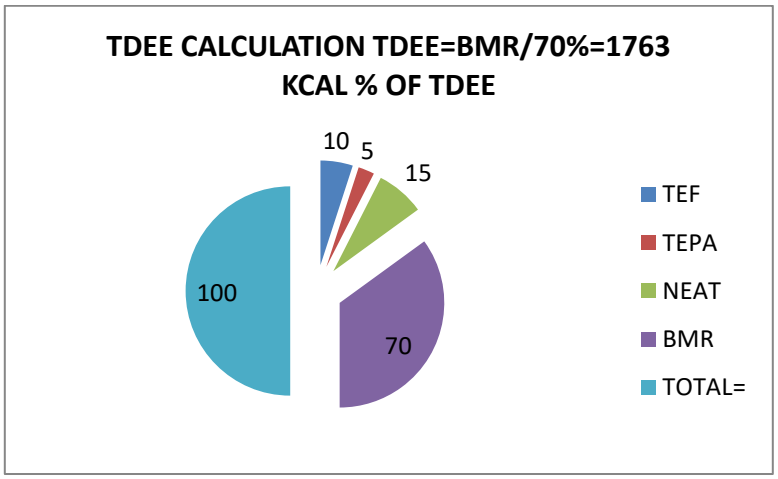


Chart that shows TDEE formula

The thermal effect of food (TEF): the energy cost of chewing, swallowing, digesting, absorbing and storing food

The thermal effect of physical activity (TEPA): the energy of activity (e.g., exercise, physical activity) and non-exercise activity thermogenesis (NEAT).*

* Non-Exercise Activity Thermogenesis: Energy expended for everything you do that does not include sleeping, eating, physical activity or exercise – ranges from simple standing to fidgeting and moving about.

The 4 variants of energy expenditure are broken down like this, this is an average;

BMR = 70% of TDEE

NEAT = 15% of TDEE

TEPA = 5% of TDEE

TEF = 10% of TDEE

We cannot do much to change our BMR; it is influenced by our sex, height, weight and body composition. As we know diets rarely, work in the long term.

Sl. No.	Life Style	Activities	Physical Activity level / factor (according to ICMR)	John's approx. TDEE
1	Sedentary	If you're sedentary, your daily activities include: • Activities of daily living only, such as shopping, cleaning, watering plants, taking out the trash, walking the dog, mowing the lawn and gardening. • No moderate of vigorous activities. • Unless you do at least 30 minutes *per day* of intentional exercise, you are considered sedentary. • Spending most of the day sitting (e.g. bank teller, desk job)	1.2	BMR × 1.2
2	Lightly Active	• If you're lightly active, your daily activities include: • Activities of daily living only, such as shopping, cleaning, watering plants, taking out the trash, walking the dog, mowing the lawn and gardening. • Daily exercise that is equal to walking for 30 minutes at 4mph. For an adult of average weight, this amount of exercise will burn about 130-160 additional calories. • More intense exercise can be performed for less time to achieve the same goal. For example, 15-20 minutes of vigorous activity, such as aerobics, skiing or jogging on a daily basis would put you in this category.	1.375	BMR ×1.375

3	Active	• If you're active, your daily activities include: • Activities of daily living only, such as shopping, cleaning, watering plants, taking out the trash, walking the dog, mowing the lawn and gardening. • Daily exercise that is equal to walking for 1 hour and 45 minutes. For an adult of average weight, this amount of exercise will burn about 470-580 additional calories. • More intense exercise can be performed for less time. For example, jogging for 50 minutes per day.	1.55	BMR × 1.55
4	Very Active	• If you're very active, your daily activities include: • Activities of daily living only, such as shopping, cleaning, watering plants, taking out the trash, walking the dog, mowing the lawn and gardening. • Daily exercise that is equal to walking for 4 hours and 15 minutes. For an adult of average weight, this amount of exercise will burn about 1,150-1400 additional calories. • More intense exercise can be performed for less time. For example, jogging for 2 hours minutes per day. • Spending most of the day doing heavy physical activity (e.g. bike messenger, carpenter)	1.725	BMR × 1.725
5	Extreme active	These people engage regularly in strenuous work for several hours. Example- a competitive cyclist. A person who enjoys and values an active lifestyle very much and is thus maximizing the health benefits associated with adequate exercises.	1.9	BMR × 1.9

DISCUSSION

I hope this information helps to realise how unsustainable a long-term calorie deficit is, especially if you are limiting your calories well below your BMR. Your body will simply not be able to sustain you. Have you ever craved food when you are on a diet? That is your body crying out for nourishment. When i started actually feeding my body properly, I was amazed that I was not obsessed with the idea of eating chocolate all the time!

How many calories you burn in a day depends on several factors that are out of your control. The best way to increase your TDEE is to add exercise to your day and decrease your time spent being sedentary. These small changes will provide a bevy of benefits such as reduced risks of diseases, longer lifespan, better mental health, and more.

Knowing your TDEE also can help you create a plan for weight maintenance, gain, or loss. To lose weight, a combination of nutrition and exercise is best. Be sure to consult a healthcare provider or a registered dietitian, though, before you make changes to your diet and exercise plans. They can help you set goals that are right for you and your situation.

CONCLUSION

Again, the relationship between BMR and weight loss and TDEE is key to accurately setting your weight loss goals.

Just knowing what your body needs and how your unique BMR and TDEE affect your weight loss strategy will help you immensely when trying to lose weight.

Without your metrics, you are just guessing.

Start by calculating your BMI & BMR — reduce as many variables as you can, and then figure out your TDEE.

Once you have your numbers, use a calorie calculator, pick an energy deficit that you feel confident sticking to, and start your journey toward the life of your dreams.

Wishing you all the luck!

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