

Physical activity and health

Physical activity can be defined as ‘any bodily movement generated by skeletal muscles at the expense of energy utilization’: lifting, working out, playing, travelling, walking, cycling, dancing, gardening, housework are all examples of PA. **The compendium of PA** is helpful in estimating the metabolic intensity of activity, as compared to a resting stage, in terms of **metabolic equivalent tasks (METs)**. METs are used to categorize activities, for example sedentary or inactive (such as watching television, lying in **supine position**, desk work, light intensity or effortless behaviour grocery shopping, slow walk), moderate intensity (such as slow cycling, lawn mowing), and energetic activity (such as fast cycling, jogging, running). Apart from PA levels, also the individual’s **genetics influence** PA results and the onset of several **NCDs**, among which obesity and cardiovascular diseases. Several studies have reported that **physical inactivity** leads to an enhanced risk of all-cause **mortality**, overall poor health, and lower **life expectancy**, with high rates of **morbidity** and mortality in patients with **underlying** chronic diseases such as hypertension, diabetes, CVD, chronic obstructive pulmonary disease (COPD), especially when the patient’s **BMI** is above 30, indicating obesity. These studies have also pointed out that a minimum increase in physical activity, such as adding an hour of walk weekly, could significantly improve the overall health and reduce the risk of **mortality**. Furthermore, vigorous or high intensity physical activity not only stimulates the body systems, but also exerts positive effects on overall health condition. For instance, strong aerobic or endurance activities (like swimming or fast running/walking 150 minutes per week) not only reduce high blood pressure and type 2 diabetes, but also improve the lipid profile and decrease the risk of cardiovascular diseases. Additionally, weight endurance and weight-supporting exercises such as skipping, jumping, weight training, and using playground equipment, lead to the development of a healthy bone mass, bone health, muscular power, and musculoskeletal fitness.

Effects of physical activity on cardiovascular diseases

Physical activity does wonders on heart health and circulation. This can be assessed by a simple fact: men are less prone to serious heart disease than women are, because generally they are more physically active. Physical activity, however, reduces 30-40% CVD risk in women. Regular exercise will attenuate chronic heart diseases by improving the cardiovascular system (the heart contraction and relaxation is refined with effective blood pumping and circulation) and by increasing lung capacity to facilitate oxygen intake and to improve dilation of blood vessels.

Additionally, altering blood lipid profiles by increasing ratio of protective high-density lipoprotein (**HDL**) to low density lipoprotein (**LDL**) and an enhanced usage of fat as fuel. This leads to a reduction of heart disease and stroke risk factors, such as high blood pressure and abnormal blood lipid profiles.

Effects of Physical activity on Type 2 diabetes

Type 2 diabetes is mostly seen in adults over 40 years, but also in children and young people having a sedentary lifestyle and obesity. Studies have shown that PA enhances blood glucose control and slows down the onset of type 2-diabetes in both men and women. Studies also show that, rather than sedentary activities, physical activity reduces the risk of type 2-diabetes in both men and women. High risk individuals with obesity and **inheritee** or impaired **glucose tolerance**, can reduce their risk of having type 2-diabetes risk by **brisk** exercises. Physical activity reduces risk of diabetes by long-term and short-term improvements in insulin action for better glucose control. In older men, exercise training for two months shows significant improvement in insulin sensitivity and fasting glycaemia.

Effects of physical activity on weight management and obesity

Obesity has a strong **correlation** with physical inactivity. It's a common observation that people having sedentary lifestyle have a lower metabolic rate and tend to gain weight over time and become obese while those having regular exercise, walking or other forms of physical activity have a higher metabolic rate and are lean. In addition, less physical activity means less energy expenditure, which results in weight gain over time and vice versa [38]. Obesity has turned into an **epidemic** nowadays, with nearly half of the world population being obese [39]. For instance, nearly three-fourths of the adult population in the USA are obese. Similar trends exist in other westernised countries and, according to the EU, countries estimate that in 2008 23% women and 20% men are overweight or obese in the European countries [40]. In addition, a gradual increase in obesity has been observed also in children and adolescents in Europe [41]. These increasing trends in obesity and being overweight are largely dependent upon the physical inactivity as well as on dietary habits. Westernised food regime, with fried and fat-rich food coupled with high sugar and salt intakes, less vegetables and fruits more red meat are the contributory factors of high BMI in half of the western population. Besides that, inadequate physical activity with more sedentary lifestyle is the major cause for increased obesity and overweight in Europe. Physical activity coupled with proper food intake has an inverse effect on weight gain and obesity. High physical activity leads to high energy expenditure and, correspondingly reduction in stored fats (**adiposity**) and lower BMI. In addition, this helps to lower diabetes and high blood pressure, and also improves lipid profile that ultimately reduces the risk of developing NCDs.

Comprehension Questions :

Basic Understanding

1. **Definition:** How is physical activity (PA) defined in the text? Provide examples.

Physical activity (PA) is defined as "any bodily movement generated by skeletal muscles at the expense of energy utilization." Examples include lifting, working out, playing, travelling, walking, cycling, dancing, gardening, and housework(Physical activity can b...).

2. **METs:** What are metabolic equivalent tasks (METs), and how are they used to categorize physical activity levels?

Categorization of Activities

3. **Intensity Levels:** What activities are classified as:
 - Sedentary or inactive?
 - Moderate intensity?

- Energetic activity?

Health Implications

4. **Consequences of Inactivity:** What are the health risks associated with physical inactivity according to the text?
5. **Benefits of Increased Activity:** What health benefits are mentioned for increasing physical activity, even minimally?

Specifics and Applications

6. **High-Intensity Exercise:** What specific benefits does vigorous or high-intensity physical activity provide?
7. **Musculoskeletal Fitness:** Which activities are highlighted as beneficial for developing bone health and muscular power?

Critical Thinking

8. **Genetics vs. Activity:** How do genetics and physical activity interact to influence health outcomes?
9. **Application in Daily Life:** How can the information about METs and activity levels be applied to create a personal fitness plan?

Basic Understanding

1. **Definition:**
Physical activity (PA) is defined as "any bodily movement generated by skeletal muscles at the expense of energy utilization." Examples include lifting, working out, playing, travelling, walking, cycling, dancing, gardening, and housework(Physical activity can b...).
2. **METs:**
Metabolic equivalent tasks (METs) are used to estimate the metabolic intensity of an activity compared to a resting state. They help categorize activities into levels such as sedentary, moderate, or energetic(Physical activity can b...).

Categorization of Activities

3. **Intensity Levels:**
 - **Sedentary or inactive:** Watching television, lying in a supine position, desk work, grocery shopping, and slow walking.
 - **Moderate intensity:** Slow cycling, lawn mowing.
 - **Energetic activity:** Fast cycling, jogging, running(Physical activity can b...).

Health Implications

4. **Consequences of Inactivity:**
Physical inactivity is associated with increased risk of all-cause mortality, poor health, lower life expectancy, and higher morbidity and mortality rates in individuals with chronic conditions such as hypertension, diabetes, cardiovascular diseases (CVD), and chronic obstructive pulmonary disease (COPD), particularly in those with obesity (BMI above 30)(Physical activity can b...).

5. **Benefits of Increased Activity:**

A minimal increase in physical activity, such as adding an hour of walking weekly, can improve overall health and significantly reduce the risk of mortality(Physical activity can b...).

Specifics and Applications

6. **High-Intensity Exercise:**

Vigorous or high-intensity physical activity, such as swimming or fast running/walking for 150 minutes per week, reduces high blood pressure, improves the lipid profile, lowers the risk of type 2 diabetes and cardiovascular diseases, and exerts positive effects on overall health(Physical activity can b...).

7. **Musculoskeletal Fitness:**

Weight-endurance and weight-supporting exercises, including skipping, jumping, weight training, and using playground equipment, help develop healthy bone mass, improve bone health, enhance muscular power, and boost musculoskeletal fitness(Physical activity can b...).

Critical Thinking

8. **Genetics vs. Activity:**

Individual genetics influence the outcomes of physical activity and the onset of non-communicable diseases (NCDs) like obesity and cardiovascular diseases. This highlights that while activity is crucial, genetic predispositions also play a role in health outcomes(Physical activity can b...).

9. **Application in Daily Life:**

The concept of METs and categorization of activities by intensity can help individuals choose appropriate activities based on their fitness goals. For instance, someone aiming to reduce high blood pressure might prioritize high-intensity activities like fast running or swimming(Physical activity can b...).