

4. MANAGEMENT OF HUMAN ENERGY

- 4.1 Definition and Concept of Human energy
- 4.2 Energy Cost of Household Activities
- 4.3 Meaning, Types and Controlling of Fatigue
- 4.4 Management Process Applied to Human Energy

4.1 Definition and Concept of Human Energy :

Let's Discuss :

We have learnt about the human energy as a resource in XI standard. In XII standard we will learn about its management. Everyone requires energy to do any type of activity. All body parts need energy to do the work. So, energy is the basic requirement of human being for growth and development and also for physical and mental output. Human energy is received from the food consumed by an individual. Certain amount of energy is needed for natural body processes such as respiration, circulation, secretion, excretion etc. This is called **Resting or Basal Metabolism**. In addition to this, energy is also required for performing a particular task. But availability of energy to anyone depends on his or her mental health and physical status. The amount of energy available to the individual varies with their age, sex, weight, physical health, physical phase, mental status and interest in specific activity. Hence, energy management is very difficult and complex.

What is meant by Human Energy ?

Energy is an essential part of our daily life. It is the unseen force necessary to work, development and growth. No activity is possible without energy.

Definition : Energy is defined as capacity to do the work. It can also be defined as ability of a person to do the mental and physical work.

Definition of Energy Management : It is the process of monitoring, controlling and conserving energy for doing a particular activity.

Remember it :

Everyone requires energy to perform any task. The amount of energy required for performing particular task varies from person to person. It depends mostly on body structure,

physical and mental health, interest and skills required for performing the task. Energy requirement also depends on the nature of work, use of body posture, working conditions etc. If a person is healthy and mentally sound, interested in particular task and has proper posture at work and gets congenial work environment he will definitely conserve the energy with positive output. Hence, energy management is needed to achieve the goals.

4.2 Energy cost of Household Activities :

The knowledge about energy costs of various activities is very essential for conserving the energy. In order to have a well balanced energy spreading pattern, one needs to know the cost of energy required for various activities.

Definition :

Energy Cost -The energy required to perform any task is called as "energy cost".

Always Remember :

The human energy is required to perform any activity needed for various muscular efforts as well as maintaining natural body processes.

Energy cost of a particular activity can be calculated by deducting total energy required for performing the task with energy required for basal metabolism. Thus, difference between total energy cost of task and energy cost for resting metabolism gives the energy cost of a particular work.

Formula for Total Energy Expenditure (TEE) and Total Cost of Activity (TCA)

- **Total energy expenditure (TEE)**
TEE = Energy required for basal metabolism + Energy required for particular activity.
- **Total cost of particular Activity (TCA)**
TCA = Energy required for particular activity – Energy required for basal metabolism.

The amount of energy required for a particular activity is also measured in terms of Oxygen consumption. It is expressed in terms of Calories. One calorie is the amount of heat required to raise the temperature of one gram of water to 1°C. 1000 calories is equal to 1 kilo calorie.

Unit of energy is kilo calorie denoted as Kcal or Kilo joules denoted as KJ.

As stated by **WHO (World Health Organization)**, the energy expenditure (Kcal/hour) by men and women is as follows:

Sr. no.	Type of Work	Men	Women
1.	Light	140	100
2.	Moderately heavy	175	125
3.	Very active	240	175
4.	Very heavy work	300	225

Fig. (Table) 4.1 Energy required by men and women for different types of work

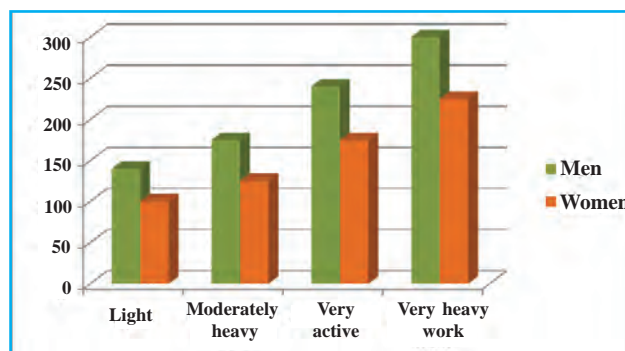


Fig 4.2 Graph indicating energy required by men and women for different types of work








The household activities are classified into three categories on the basis of energy cost:

- **Light work :** It is the type of work that requires less than 100% additional energy above the resting level. For example, watching TV, peeling potatoes, kneading, cutting vegetables, dusting, sewing, hemming, knitting etc.
- **Moderate work :** It is the type of work that which requires additional energy between 100-150% more above the resting level. Example- Ironing clothes, sweeping floor, making chapaties, washing vessels etc.
- **Heavy work :** It is the type of work that requires 150-200% additional energy above the resting level.

Example - Washing clothes, mopping floor, grinding masala, fetching water, going upstairs, lifting heavy items etc.

Sr. no.	Type of Work	% Above Resting	Activities
1.	Light work	Below 100	Hemming, sewing, knitting, crocheting, dusting, chopping etc.
2.	Moderate heavy	100-150	Ironing, kneading dough etc.
3.	Heavy work	150-200	Mopping, Scrubbing floor, lifting heavy objects, fetching water, washing clothes, climbing stairs with heavy luggage etc.

Fig. (Table) 4.3 The classification of household activities

Lying down	
Sitting 30%	
Standing 38%	
Walking slow 160%	
Walking fast 290%	
Walking downstairs 372%	
Walking upstairs 1336%	

(Percentage increase over lying still)

Fig 4.4. Energy requirement for different activities

The knowledge of energy cost of different types of household activities helps the individual to manage and conserve one's energy. One can

alter light, moderate and heavy work in the daily schedule and make it more comfortable.

Each and every activity requires various movements of body parts. This is called as efforts.

Definition of effort-Effort means earnest and conscientious activities intended to or accomplish something. It is force acting on a body in the direction of its motion.

When a person is doing any type of work he/she requires several types and combination of efforts. They are as follows:

1. Mental effort : It is required for doing any type of work, even for performing routine tasks. For example; reading, writing, puzzle solving, thinking, studying etc.

Doing routine work for example cutting vegetable, swiping, cooking dressing, cleaning also requires mental thinking about how to perform and way to perform the activity.

2. Visual efforts : While performing every activity, each one requires visual effort. Our eyes must direct the movements of hands, feet and other body parts in order to complete the work. For example, while cooking eye movements are necessary to direct the body parts such as hands to add the ingredients, mixing well, frying, kneading, washing etc. The activities such as reading, watching requires intensive visual efforts.

3. Manual efforts : For performing each activity, person requires manual efforts. Manual efforts means the work done by hand movements. For example, cooking, mopping, washing utensils, sweeping, carrying things etc.

4. Torsal efforts : Movements of the torso is called torsal effort. Torso means middle part of the body excluding hands, legs and head. Example of torsal movements are bending, leaning, sitting, rising, turning etc. The activity such as washing clothes, arranging furniture, mopping requires torsal effort.

5. Pedal efforts : The activities performed by legs are called as pedal efforts. Many activities in day to day life have to be completed by pedal efforts. Walking, running are the examples of pedal efforts.

- **Energy demands during different stages of life cycles :** Energy demands during different stages of life cycles are listed below:

Stage I : Foundation

This is the beginning stage of family life. It consists of only husband and wife in the family. So, the energy requirement for doing the household work for two persons will be less. But if the homemaker is working outside then energy demands will be more. Thus, the home maker must be aware for balancing the work in home and outside.



Stage II : Expansion

In this stage there is arrival of new members in the family. Hence, it is a very busy stage for



every home maker in her life and demand more energy. Children are dependent on their parents. Caring and rearing of children demand more energy. So, more awareness regarding energy cost is needed to avoid tiredness and to maintain health.

Stage III : Contraction or Retirement



In this stage children are brought up and are independent. Hence, the workload on homemaker will be less. Many times children also share the work and responsibilities will be reduced. This results in less demands of energy.

Let us discuss :

4.3 Meaning, Types and Controlling of Fatigue

When a person is doing any activity for longer time, his capacity for working to do the task consistently reduces. It means his body's capacity to do the work as before is not the same. This inability to work consistently throughout the period may be due to over work, lack of concentration or lesser interest in the work or muscular strain etc. So, he or she may experience tiredness. When body is not able to do the work as before, it is called as fatigue. It can be caused by doing the activity in a particular posture, poor posture, and poor working environment, lack of interest, concentration or muscular strain.

Definition : Fatigue is tiredness or boredom arrived after performing a particular task. It is reaction of a person as a whole to a situation as he or she consciously or unconsciously interprets and evaluates it.



Fig 4.5 Causes of fatigue

• **Types of fatigue :**

Know this :

In order to conserve the energy and avoid fatigue one should plan daily activities to achieve the day to day goals. One should balance the household work in such a way that one can achieve the goals according to physical capacities. If energy consumption is greater than the physical capacities, person will develop fatigue. If person get fatigued it has adverse effect on the health and become an obstacle to achieve the goal.

Types of fatigue :

There are two types of fatigue

1. Physiological fatigue
2. Psychological fatigue

1. Physiological fatigue :

Definition : Physiological fatigue is the state of body in which one's ability to do the work is reduced. This is the after effect of previous or earlier work. Physiological fatigue reduces the physical ability of a person to do the work.

Do you know ?

For doing any work we require energy. This energy is provided to the body through food.

Energy requirement is met by glucose released by carbohydrates provided through the food. Glucose is stored in the form of Glycogen. This glycogen is oxidised or utilized by the body while doing any work. When the body is working for longer hours or during heavy muscular activities, glycogen is broken down into lactic acid and deposited in the muscles. Deposition of lactic acid in the muscles causes physiological fatigue. So, there is need to remove the lactic acid from the body. Lactic acid can be reduced by providing oxygen to the body. The oxygen will be available to the body only after rest. During rest period, availability of blood oxygen helps in oxidation

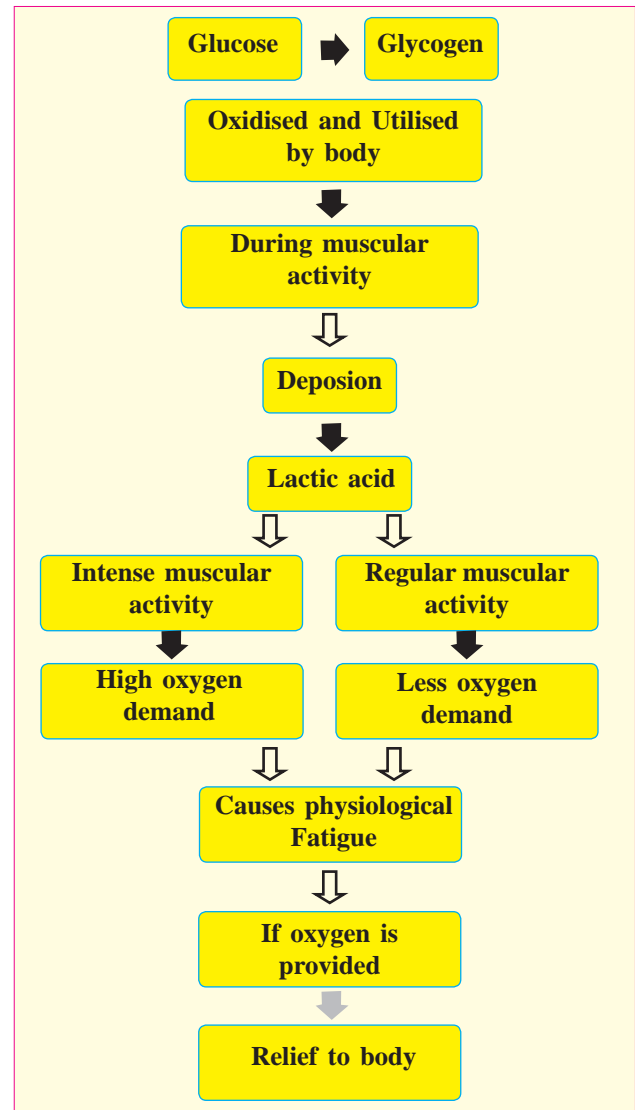


Fig. 4.6 Diagrammatic representation of physiological fatigue

of accumulated lactic acid to carbon dioxide and water. In this way, the body relives fatigue. Hence, the recovery of physiological fatigue is possible by removal of lactic acid and carbon dioxide from the body.

• **Factors affecting fatigue:**

- Likes and dislikes of person
- Type of activity performed - light, moderate and heavy
- Posture in performance of activity- natural or unnatural
- Duration of performance-time required to complete the activity
- Health of person- poor physical health, poor sleep, illness etc.

• **Measures to relieve the physiological fatigue :** Following are the measures to relieve the physiological fatigue :

1. Rest periods : Rest periods during the activity help to prevent physiological fatigue. The length of rest period and number of intervals will depend upon the type and nature of activity and individual work pattern. It means, if the activity or work is heavy it is necessary to have rest period for longer period than the moderate or light activity.

It also depends upon how much the person is fatigued. When the person is more fatigued longer rest period is needed.

2. Balanced diet : A person must be healthy enough for doing any type of work. If the person is under weight or over weight, it has direct effect on his efficiency of work. Hence, balanced diet with proper intervals of eating is very essential for maintaining efficiency in work and avoiding fatigue.

3. Recreation : Recreation can help in reliving fatigue. If person gets tired after work, some recreation will be helpful to overcome the fatigue.

4. Change of job : Change of work is also a type of rest for a particular work. One can alter heavy work with light one and vice a versa. It will help to relieve the muscular tension and thus relieve the fatigue.

5. Utilizing energy in a proper way : By avoiding unnecessary steps in the work, energy can be saved. This can be achieved by simplifying the work. Proper way of utilizing energy will help in reducing fatigue.

6. Use of proper body posture : Many studies have proved that use of improper or wrong postures increase the fatigue. Improper body postures increase muscle tension and pain in joints, ligaments and tendons. Adoption of proper body posture and keeping body parts in alignment help to increase the productivity in work and lessens the fatigue.

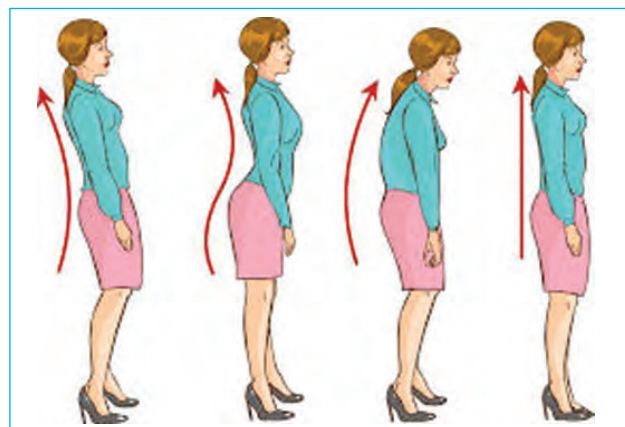


Fig. 4.7 Maintaining good posture is necessary to avoid fatigue

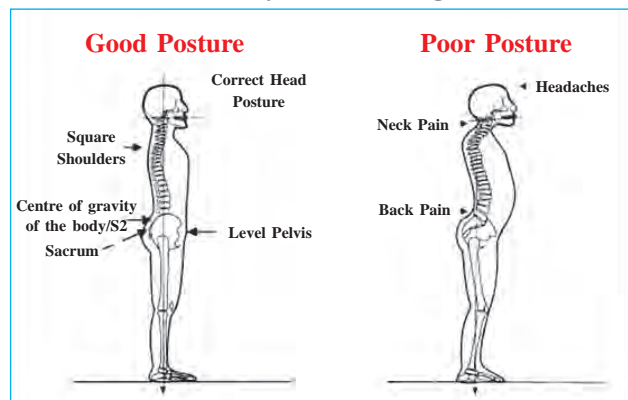


Fig. 4.8 Good posture lessen the fatigue

- **Psychological fatigue** : Many of us experience such type of fatigue in our day to day life. According to **Howard Bartley** psychological fatigue is simply one form of inadequacy to meet the demands the person recognizes. It may occur due to lack of knowledge, skills and capability to perform any type of work. This type of fatigue reduces the capacity of an individual and thus the output.

There are two types of psychological fatigue :

1. Boredom fatigue : If a person dislikes the work or work is monotonous and repetitive in nature he desires to stop the work. The person feels unsatisfied and restless. Boredom may arise from stereotype nature of job, negative attitude towards work, person's habits, dislikes, unsatisfactory working conditions etc. In such conditions work will be interrupted and disliked which lead to boredom fatigue.

2. Frustration Fatigue : When a person is not able to achieve the goals he/she sets or his/her plans fail to work or he/she is a failure to achieve better results, it leads to frustration. Poor planning, mental tensions or pressure of completing work in time, non cooperative atmosphere while working, lack of skill, inability to satisfy the demands, worry and tensions etc. can cause this type of fatigue. Lack of appreciation and motivation may also increase such type of fatigue.

- **Symptoms of psychological fatigue** : Psychological fatigue can be easily recognized by some symptoms which are as follows :

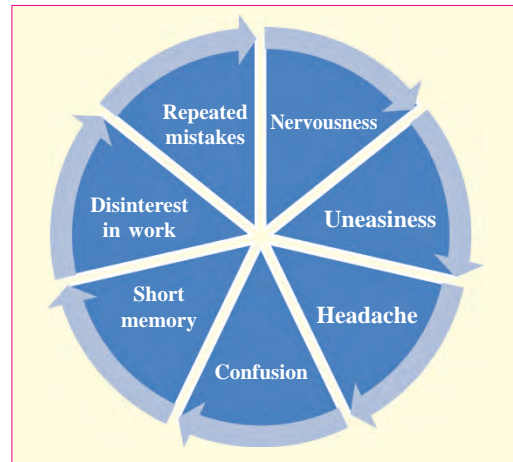


Fig. 4.9 Symptoms of psychological fatigue

- **Measures to relieve psychological fatigue:** It is necessary to overcome and manage the psychological fatigue in order to get better results. There are some measures to relieve such type of fatigue.
 - **Motivation** : It plays an important role in reliving fatigue. When the person dislikes the job or is a failure in his/her works, he/she can be encouraged by providing motivation. High motivation makes more mental energy available for the particular task where as less motivation releases less energy. Thus, it can be said that motivation plays an important role in reliving the fatigue.
 - **Develop working skills** : According to Johnson, a skill means the ability to execute a pattern of behavioural elements in proper relation to a certain environment. Skills in any work are necessary to improve the performance of work. Acquiring skills in performing the activity makes easy and smooth performance of work and achievement of the set goals.
 - **Creating interest in job** : Interest in any activity enhances the job performance. It can be achieved by gaining knowledge regarding the particular work. Interest

reduces the energy consumption and reduces the fatigue too. Interest can be created in any activity by using variety of ideas.

- **Setting immediate goals :** Dividing the work in small steps lessens monotony in the work and makes it easy to achieve the short term goals. If small steps/goals are achieved it gives satisfaction to the worker. Achieving intermediate goals ultimately helps in reaching the final goal and thus helps in relieving the fatigue.
- **Change in routine time :** Routine activity in home making makes the home makers mentally fatigued. Change in daily routine pattern helps to avoid fatigue. For example, going out for shopping or recreational activity, or doing the work of his/her interest such as singing or painting will make a complete change in the routine. It is needed to avoid fatigue and speed up the remaining activity.

4.4 Management Process Applied to Human Energy :

The steps in management process planning, controlling and evaluation are applicable to human energy management. For effective use of energy, individual needs to plan, control and evaluate the daily work.

1. **Planning :** This is the first step in management process. It involves making the activity plans and implementing them. A person should plan the daily routine activities as per energy demands, ability to work and effects of fatigue arising after performing the activities. Planning

is also essential to conserve the energy and balance the energy expenditure pattern. Management of energy involves time management because time and energy are inseparable. In other words, we can say that they are closely related. Here, planning is needed to make activity plan as per the time available, energy cost for different activities and rest periods to avoid fatigue. The main aim is to reduce the amount of energy to be used.

2. **Controlling :** Controlling is the process of putting the plan in actions. Knowledge of proper and simple working methods in relation to energy consumption as well as clear instructions is needed in order to achieve the desired results. Motivation while working gives energy to the worker while carrying out the activity plans and controls the fatigue. Skills developed for particular work improve the quality of work as well as make it easier to complete the task in the given time and energy.
3. **Evaluation :** Evaluation is checking the work for its effectiveness. It is a measure by which success or failure of plans can be evaluated. Learning self evaluation for the use of energy will help to improve the future plans. So, after completing any activity it is necessary to evaluate the work for energy used for activity. One can ask some questions to evaluate the success in utilizing the energy.
Thus, application of management process helps in managing and conserving energy.

Can You Recall ?

- Energy is the ability of person to do the mental and physical work.
- The amount of energy required for various activity varies from person to person and mostly depends upon the type of work.

- Performing any type of activity requires several types of efforts. Those are mental. Visual, manual, torsal and pedal efforts.
- Energy required for doing any task is called energy cost. On the basis of energy cost, household activities are classified as light, moderate and heavy work.
- Fatigue means tiredness or broadness arrived after particular work. There are two types of fatigues-Physiological and psychological fatigue.
- Use of proper body posture, maintaining rest periods, recreation, change of work and having balanced diet are measures to relieve the physiological fatigue.
- Motivation while working, developing skills, creating interest in job and setting short term goals are some measures to relieve from psychological fatigue.
- For effective use of energy there is a need to person need to plan, control and evaluate the work.
- Ultimate goal of energy management is to conserve the energy.

Exercises

• Objective questions :

1) Multiple choice questions :

1. Energy means ability of a person to do _____
 a) physical work
 b) psychological work
 c) mental work
 d) physical and mental work
2. It is easy to measure time and money, but it is difficult to measure energy without _____
 a) special equipment
 b) formulae
 c) observations
 d) calculations
3. If the work is done with _____ speed, energy cost will be Very high.
 a) less
 b) more
 c) medium
 d) very high
4. _____ is certain amount of energy required for maintaining natural body process.
 a) Metabolism
 b) Resting metabolism
 c) Work metabolism
 d) Any other
5. Heavy work demands _____ additional energy than the resting level.
 a) below 50%
 b) below 100%
 c) 150-200%
 d) above 200%

2. Identify whether the following statements are True or False :

1. During energy management fatigue should not be taken in to consideration
2. Energy is the basic requirement of man for the maintenance of life growth and physical output
3. Unit of energy is kilo gram or gram

4. Energy is also measured in terms of oxygen consumption by body per minute.
5. The energy required for performing any tasks is called energy management.

• **Short Answer questions :**

1. Define the terms :

1. Energy
2. Energy cost
3. Fatigue
4. Energy management

2. Differentiate between the following :

1. Physiological fatigue and psychological fatigue
2. Light work and heavy work
3. Manual efforts and pedal efforts
4. Boredom fatigue and frustration fatigue

3. Write short notes :

1. Types of efforts
2. Types of fatigue
3. Controlling fatigue
4. Energy demands during different stages of life cycles
5. Causes of fatigue

Project/Assignment :

- Identify the common fatigue situations faced by you and your family members.
- Recognise your mental fatigue situation and suggest remedies for it.

Related Activity :

- Write down the reasons of fatigue after performing the activities in a day by you.

