open text-based Assessment

2016-17

Class XI

Biology

Central Board of Secondary Education

Shiksha Kendra, 2, Community Centre, Preet Vihar, Delhi-110092, India

OPEN TEXT BASED ASSESSMENT 2016-17

Biology (044) Class - XI

Theme 1: Long Live Humanity

Learning Objectives

- To make the students aware of organ donation and transplantation processes.
- To sensitize the students with policies and priorities given to the patients for organ transplantation.
- To analyze the reasons behind less number of organ donations.
- To appreciate the voluntary contribution of living donors.
- To understand the responsibilities of general public for recycling of organs.

A note to readers

Following text passage is designed to understand the value of long live humanity through organ donation services. Living and cadaver donors are identified as main types of donars. While views of organ donation are positive but still there is a large gap between the numbers of registered donors compared to those awaiting organ donations on a global level. Awareness about organ donation leads to greater social support for organ donation. To be considered as a living organ donor a person should contact a hospital with a transplant centre. A list of transplant centres can be found through the Organ Procurement and Transplantation Network, NOTTO (National Organ and Tissue Transplant Organisation)

OPEN TEXT BASED ASSESSMENT 2016-17

Biology (044) Class - XI

Theme 1: Long Live Humanity

Abstract

What began with the kidney has now expanded to hearts, lungs, livers and other organs. Development of cadaveric and living organ donation practices, deciding who can donate organs has been a flexible and changing process, starting with living donors and then moving to include deceased and brain dead donors. The debate about increasing and restricting the pool of eligible donors continues today.

Development of anti-rejection drugs have done wonders to increase the success of organ transplants. This intriguing field of study becomes more attractive to some researchers as the number of people needing organ transplants through donation continues to grow. Stem cell research is examining adult and human embryo cells in an attempt to discover how organs are developed and what stimulates their growth.

The way humans die has changed significantly during the past half-century. Once a sudden and unexpected event, death has become an actively managed and often prolonged process that occurs more often in hospitals than in the community. Advances in healthcare, in particular, have transformed the way we die. Organ failure, for example, is no longer inextricably linked to death. Patients with end-stage renal disease are routinely dialyzed for many years. The lives of patients with cardiac failure can be prolonged with inotropic and chronotropic therapies, and patients with respiratory failure can receive invasive and non-invasive ventilation in hospital or at home. Also, for more than 100,000 patients per year of the estimated 1.7 million patients worldwide in need of transplant for failing organs, the transplantation of organs and tissues from patients that have died in intensive care settings provide significant benefits - reducing mortality and morbidity, increasing long-term survival, increasing quality of life and reducing the economic burden of the cost of healthcare for patients with chronic diseases.

Organ transplantation -- the surgical removal of a healthy organ from one person and its transplantation into another person whose organ has failed or was injured -- is often life-saving and gives the recipient a wonderful new lease of life. But organ transplantation is also a major surgery that carries potential risks and drawbacks, such as the chance of organ rejection. That's precisely why you and your loved ones need to gather as much information as possible on organ transplants.

Organ donation is the donation of biological tissue or an organ of the human body from a living or dead person to a living recipient in need of a transplantation. The lungs, heart, liver, intestine, kidneys, pancreas, cornea, skin, bone marrow, heart valves, middle ear and tendons of brain dead patients can be used in other patients.

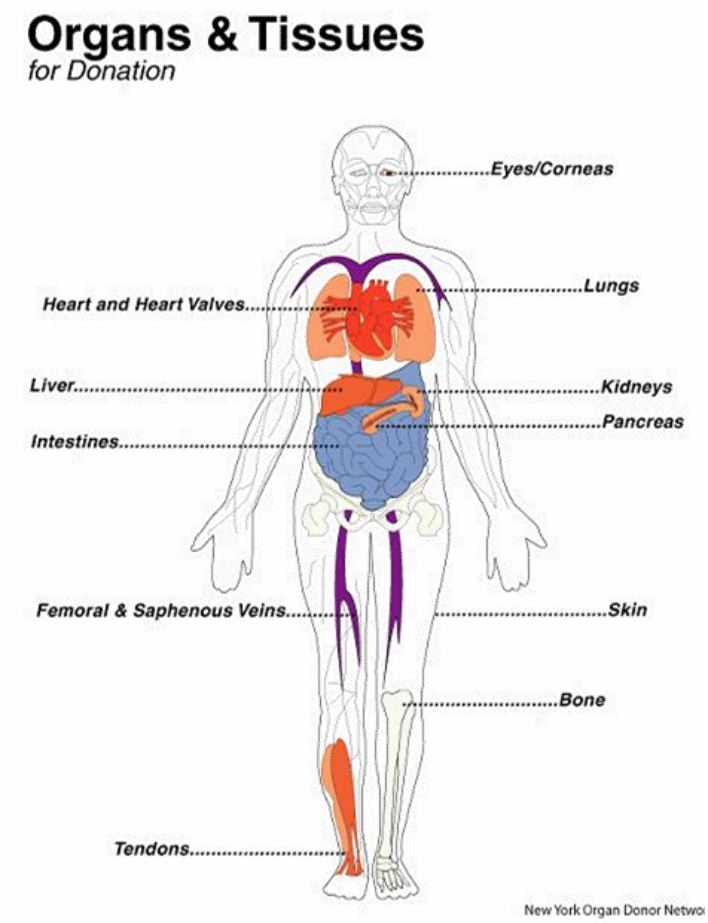


Fig 1: Different Organs used for donation

Organ donation and transplants are one of the most miraculous achievements of modern medicine. But they depend entirely on the generosity of donors and their families who are willing to make this life saving gift to others. In India, transplantation of human organs Act, 1994 legalised Brain Death and removal of organs for therapeutic purposes. It also banned commercial trading of organs from living unrelated donors.

Knowledge and Attitude towards Organ Donation

Of course, it does take a lot of courage for the grieving families to let the doctors harvest the organs of their loved ones. That too, at a time when they are just coming in terms with the irreparable loss of their family member. But by donating organs, they will set an example for others to follow. However, more needs to be done. Consider this: In India, less than 5,000 kidney transplants are carried out annually against an estimated requirement of over 175,000. Similarly, only 1,000 liver transplants are performed every year where over 50,000 perish due to end-stage liver diseases. The annual requirement of hearts is estimated at around 50,000 and lungs about 20,000.

Today in India the demand of organs for transplantation far exceeds the supply. Transplant technology and surgical methods continue to improve the enhancing chances of survival and

improved quality of life for the recipient. But this rapid enhancement in research related to transplant technology is not accompanied by a parallel increase in the availability of donor organs. The success of deceased donor programmes is dependent on knowledge and attitude of people towards organ donation.

Further studies found that 42 % persons are willing to be organ donors, 48% are undecided in urban areas, which is a large percentage of people who on effective dissemination of knowledge could be convinced to be donors. Reasons for unwillingness to be a donor may be fear of misuse of organs by medical personnel and lack of knowledge about procedure of organ donation. Three basic areas of donor risks: Surgical risks, Long-term health impacts, Emotional/psychological impacts. Small surgical issues include problems with anesthesia, infection, wound healing issues, collapsed lung fluid in the lungs (pneumonia) and pain. Long term health impacts include common misconceptions like donor will get kidney disease/failure, donor's lifespan will be shorter and donor will need major lifestyle adjustments for one kidney. Psychological impacts include: fear that the donor may have regrets, emotional struggles are not common, but possible; more likely if the transplant does not go as planned.

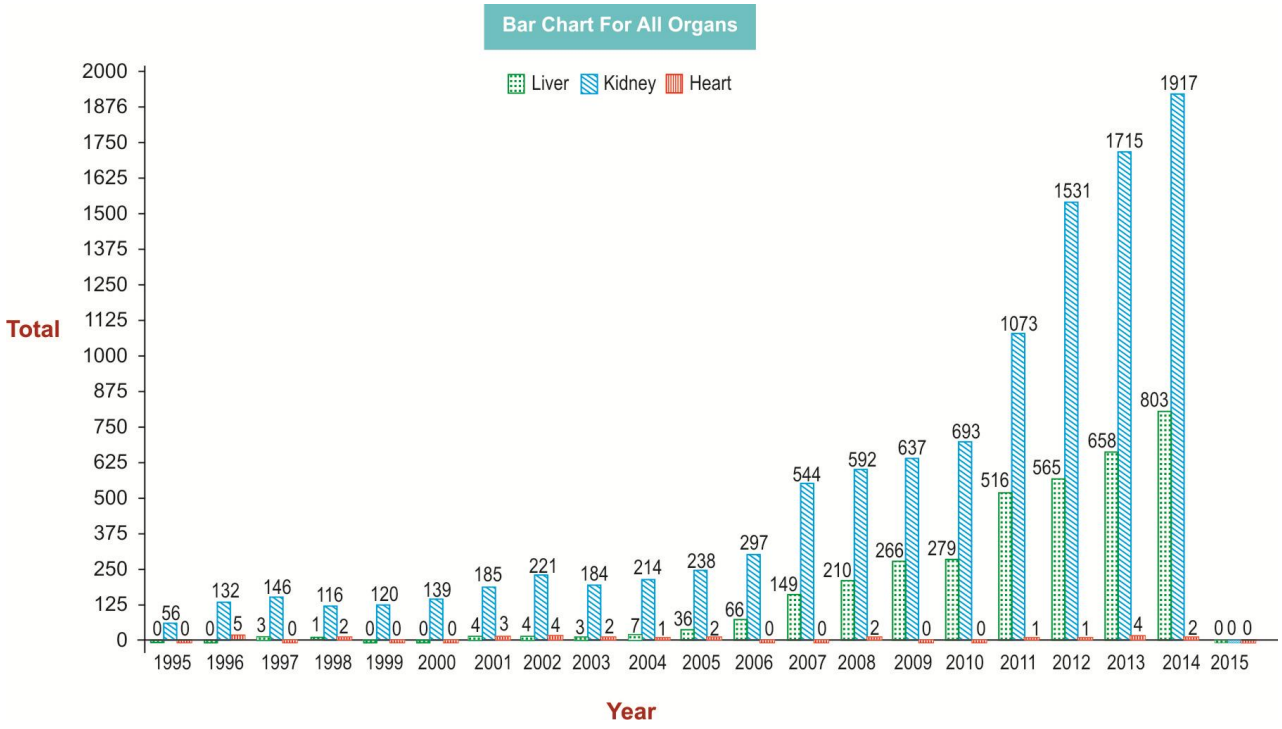


Fig 2: Statistical Analysis of donated organs (Year wise)

Types of donors

Majorly there are two types of donors: living donors and cadaver donors and two types of deaths: cardiac death and brain death.Conditions that progress to brain death include lethal head injury, brain hemorrhage. Brain death is irreversible loss of consciousness, absence of respiration, flat EEG, loss of brain stem reflexes. Brain death tests include: no papillary response to light, no eye

movement following irrigation of the ear canal with ice water, no response to corneal stimulation, no cough or gag reflex, no spontaneous breathing. Brain dead patients are always kept n the intensive care unit of the hospital and their blood pressure and respiration are artificially maintained.

Certain facts for End Stage Renal Disease (ESRD)

About two lakh people need kidney transplant every year. About 6000 transplants are done every year but only 600 use cadaver donations. Kidney failure can be a gradual process and symptoms may not be seen until the disease is very advanced. Kidney failure occurs when the kidneys are no longer able to remove waste and maintain fluid balance in the body. Without some form of treatment, this would result in death. The two types of treatment for kidney failure are dialysis or transplantation.There are two different kinds of dialysis: hemodialysis or peritoneal dialysis. Kidney transplantation is the third option for people with chronic kidney failure. In a kidney transplant, the donated kidney is surgically placed in the lower abdominal area and replaces the function of the natural kidneys.

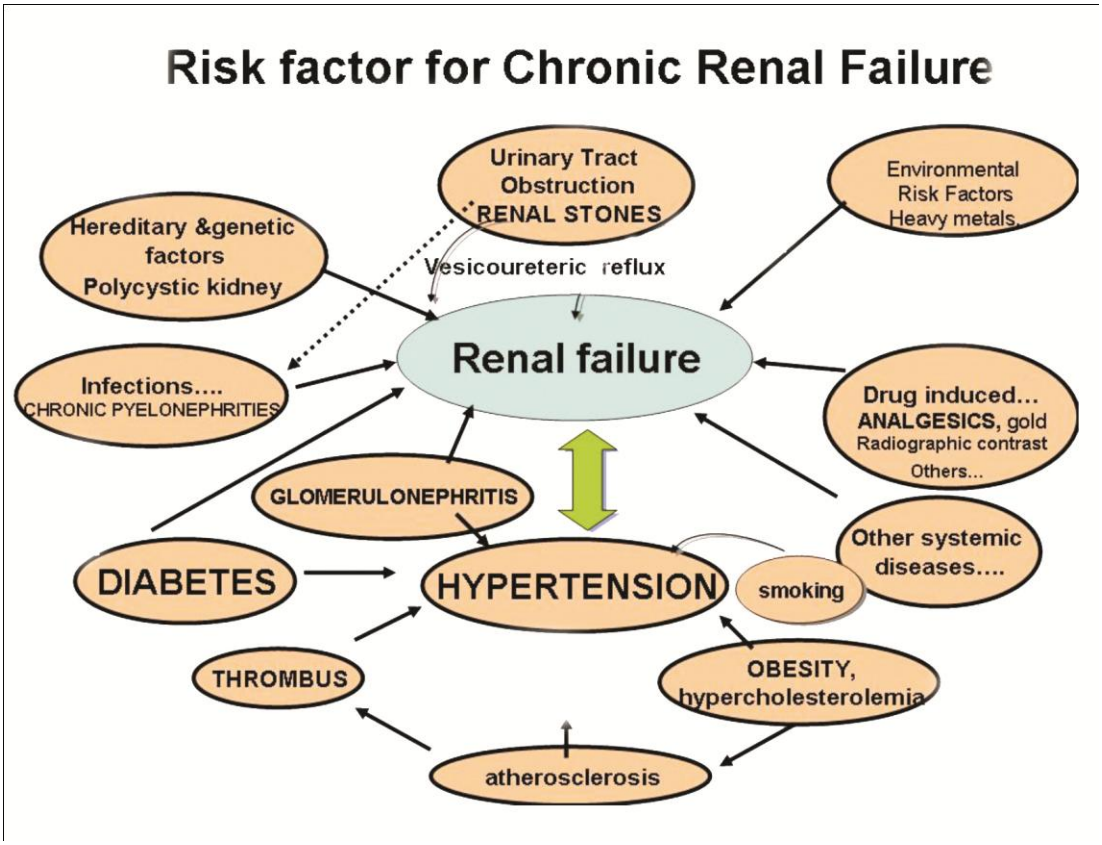


Fig 3: Various Reasons for Kidney failure

There is disparity between number of recipients requiring kidney transplant and the number of organs available for kidney transplantation because some patients need kidney on urgent basis, delay may lead to mortality. For ESRD maintenance dialysis is acceptable. There are allocation

principles, algorithms and criteria set for regional/state and national level by National Organ and Tissue Transplant Organization to decide on the priority for recieving the organ.

SCORING SYSTEM FOR MAKING PRIORITY

Sl. No.	Criteria for scoring	Points allotted
1	Time on dialysis	(+1) for each month on dialysis
2	Previous immunological graft failure within 3 months of transplantation	(+3) for each graft failure
3	Age of recipient	(+3) for less than 6 years (+2) for 6 to less than 12 years (+1) for 12 to less than 18 years
4	Patient on temporary Vascular access	
(a)	With Failed all AV Fistula sites	(+ 2)
(b)	With Failed AV Graft after all failed AVF sites	(+ 4)
5	PRA (Panel Reactive Antibody)	(+ 0.5) for every 10% above 20%
6	Previous Living donor now requiring Kidney Transplant	(+5)
7	Near relative (as per definition of THOTA) of previous deceased donor requiring kidney transplant	(+5)

Note: Patients with the same score, priority will be decided based on the seniority in the waiting list

Fig 4: Priority of waiting list

Heart Transplant and Organ Donation

Heart transplants are done soon after brain death of the donor is determined. Machines keep the heart and other organs functioning until the transplant teams arrive. The team needs to move quickly in order to obtain the heart in the best possible condition.

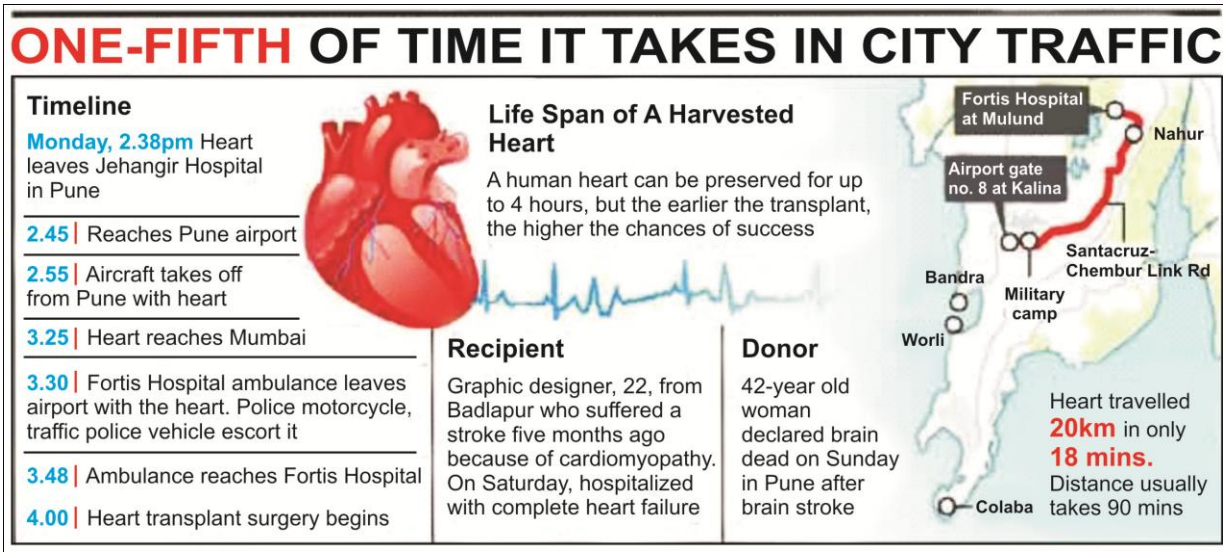


Fig 5: Timeline for a harvested Heart

Until 2013, as many as 250 donor hearts used to be discarded in the every city as medical waste even as thousands of people died of end-stage heart disease. Three years on, there has been a five-fold rise in heart transplants in Tamil Nadu. According to data sourced from the Tamil Nadu organ-sharing registry, the number of heart transplants rose from 16 in 2013 to 64 in 2015. In 2016, till May 4, 26 hearts were transplanted from brain dead donors. The mortality rate of people who make it to the list is around 35%. Ironically, the waiting time for a donor heart is lesser compared to other organs. Heart transplant was usually recommended for people with a survival rate of less than 70% within a year's span. "Their heart may be weak but we need them to be otherwise fit for the transplant. While those awaiting kidney transplants can be kept alive on dialysis, heart pumps are too expensive for most people. In the country, only Chennai, Hyderabad, Delhi, Bengaluru, Kochi, Mumbai and Visakhapatnam have done heart transplants.

Green corridors help transport organs in minutes

NEW DELHI, PTI: **A live heart was transported from IGI Airport here to Medanta Hospital in Gurgaon in 16 minutes and a liver was rushed to the institute of Liver and Biliary Sciences in 15 minutes with the help of green corridors put in place by Delhi and Gurgaon police.** While the heart was transplanted in a 35-year-old woman suffering from end-stage heart disease at Medanta, the liver went to ILBS and was transplanted in a 55-year-old man suffering from liver failure. The organs belonged to an 18-year-old Deepak Dhaketa who was declared brain dead by doctors following a road accident at Sri Aurobindo Institute of Medical Sciences (SAIMS) in Indore on April 27. His kidneys were transplanted into two paitents at SAIMS and Choithram Hospital and Research Centre in Indore. Two green corridors were created from the IGI Airport-one for Gurgaon and another for Vasant Kunj.

A liver was rushed to the Institute of Liver and Biliary Sciences in 15 minutes with the help of green corridor

"The heart arrived at the IGI airport around 1.15 pm and was immediately rushed to Medanta Hospital. Green corridor was created on the National Highway to ensure that it reached the destination covering 18 kilometres within 16 minutes.

"The liver arrived at 1.58 pm and was transported to ILBS. The ambulance covered 11.4 kilometers in 15 minutes," Shared Aggarwal, joint commissioner, Traffic said. Delhi and Gurgaon traffic police coordinated to create the green corridor on the National Highway and all entry and exit points on NH8 were closed to facilitate smooth movement.

"The crucial aspect in cases of heart transplant is that the time span between the harvesting of the organ to its implantation should not exceed four hours.

"The details of this 35-year-old woman was already there at the National Organ and Tissue Transplant Organization (NOTTO) where cases of people waiting for a donor are registered. The blood group of the recipient matched with that of the donor and the heart was allotted to her," Cardivascular Surgeon and Managing Director of Medanta Medicity Dr. Naresh Trehan said.

Dr. Anil Bhan, Cardiac Surgeon and his team from Medanta had brought the heart from Indore in a private aircraft.

"Green corridor were created with the help of police and the heart was successfully transplanted in the patient. So here the challenge was how to get it from Indore, transplant it and make it work in four hours. Even an half-an-hour delay could have caused problem. In such cases every minute counts," Dr Trehan said.

Even the patient at ILBS was in a critical condition, said a senior doctor.

Fig 6: Green Corridors

Therapeutic Factors

Additional factors to be evaluated before the organ procurement organization selects the appropriate candidate are:

A. Is the patient available and willing to be transplanted immediately?

B. Is the patient healthy enough to be transplanted?

- Once the appropriate candidate is located, the organ procurement organization takes the organ and delivers it to the transplant centre where the transplant will be performed.
- When the transplant patient is ready for the donor organ, the transplant centre then surgically removes and replaces the failed or failing organ by following general procedure.
- After the transplant, the patient embarks on a long road to recovery.
- If surgery goes well, the patient may face the possibility of rejection.

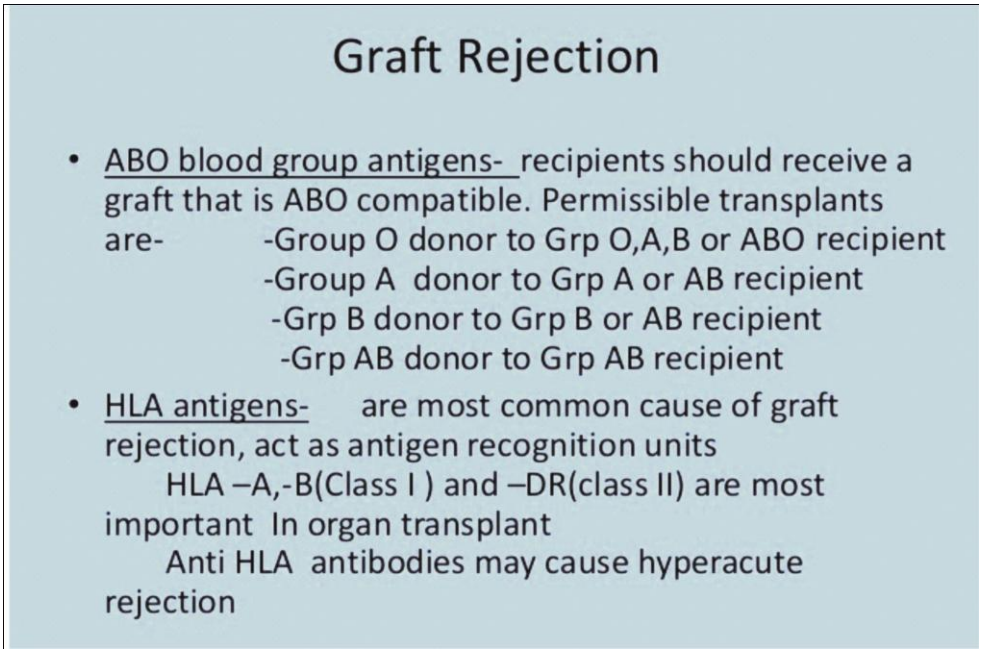


Fig 7: Showing Compatibility chart for organ transplantation

- **Rejection** is the process where the body fights off the newly implanted organ. Rejection is harmful to transplant success because the body fights off the new organ as it would a virus or bacteria. In fact, the body's immune system treats the organ as it would any other harmful foreign invader. The immune system makes proteins called **antibodies** that go to the transplanted organ and try to kill it. In order to hold back the antibodies that threaten the new organ, transplant patients have to take powerful **immunosuppressant drugs** to keep the level of antibodies down, low enough for the organ to integrate into the body and start working.

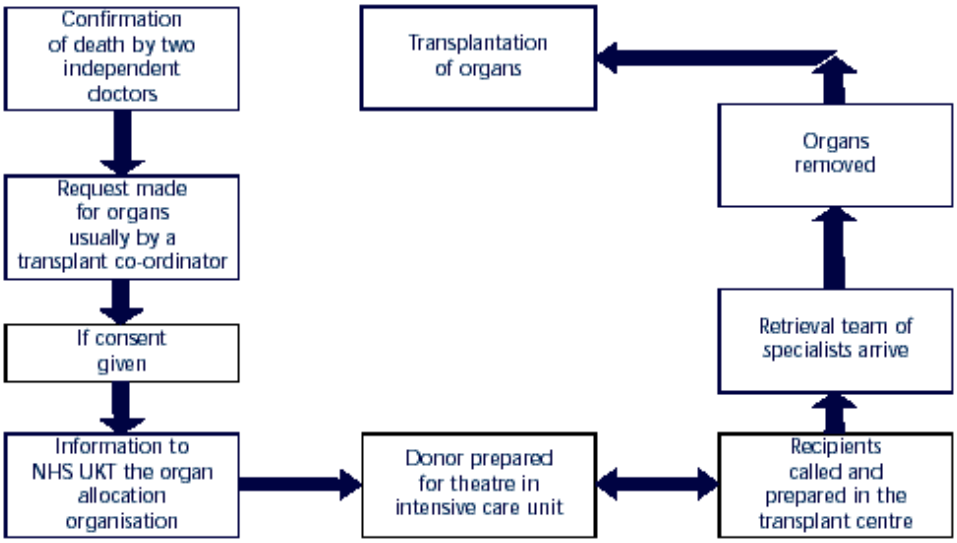
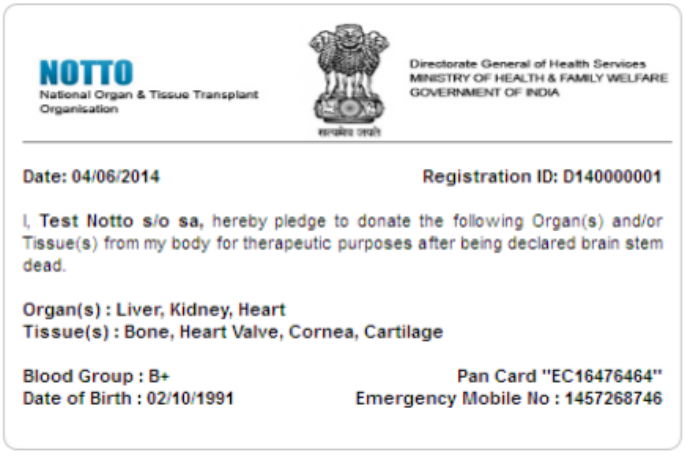


Fig 8: Procedure for transplantation of organs

Recycle Your Life: Be an Organ Donor

- Discuss with your family members
- Register on government websites (www.notto.nic.in) for organ donation
- Get organ donor card.



NOTTO
National Organ & Tissue Transplant Organisation

Directorate General of Health Services
MINISTRY OF HEALTH & FAMILY WELFARE
GOVERNMENT OF INDIA

Date: 04/06/2014 **Registration ID: D140000001**

I, **Test Notto s/o sa,** hereby pledge to donate the following Organ(s) and/or Tissue(s) from my body for therapeutic purposes after being declared brain stem dead.

Organ(s) : Liver, Kidney, Heart
Tissue(s) : Bone, Heart Valve, Cornea, Cartilage

Blood Group : B+ **Pan Card "EC16476464"**
Date of Birth : 02/10/1991 **Emergency Mobile No : 1457268746**

Fig 9: Sample of Donor Card

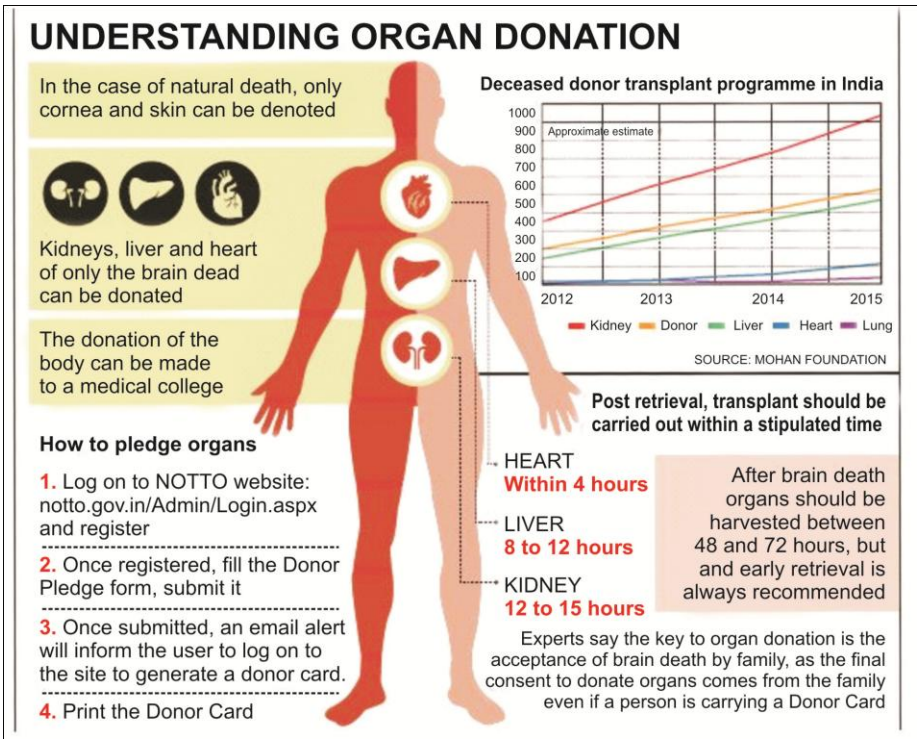


Fig 10: Procedure for organ donation

There is an urgent need for increased public awareness regarding organ donation and greater effort must be taken to dispel public concerns regarding the same. Organ donation can give a new twist to tragedy. Remember "organs wasted are lives lost". There are many social organizations like Rotary

clubs and various NGOs that works toward spreading awareness about cadaver organ donation. Their main aim is to educate the people as well as the medical professionals about the importance of organ donation and transplantation. They spread the word about cadaver organ donation through presentations at schools, colleges, religious gatherings, festival celebrations and corporate firms; TV advertisements; social media and print media; and cinemas. They have also conducted door to door awareness campaigns.

The most common causes of death are diseases of organs like heart, lungs, liver, kidneys and pancreas and these are potentially treated with organ transplantation, but our immune system rejects the allograft. **Muromonab-CD3** is an immuno suppressant drug given to reduce acute rejection in patients with organ transplants. **Stem cell** research is not only promising for developing much needed organs, but for understanding how to slow down rejection of transplantable devices **Tissue engineering:** is the use of a combination of cells, engineering and materials methods, and suitable biochemical and physicochemical factors to improve or replace biological functions.

Organ donation and transplantation is complex and costly and there is no state funding for this procedure. Most of the activity in deceased donation has been in the private sector. A significant number of donors and a large majority of recipients are from private hospitals and the large majority of the organs currently go to the rich. One method of developing equity in distribution system of organs could be to mandatorily allocate a proportion of organs for public sector institutions.

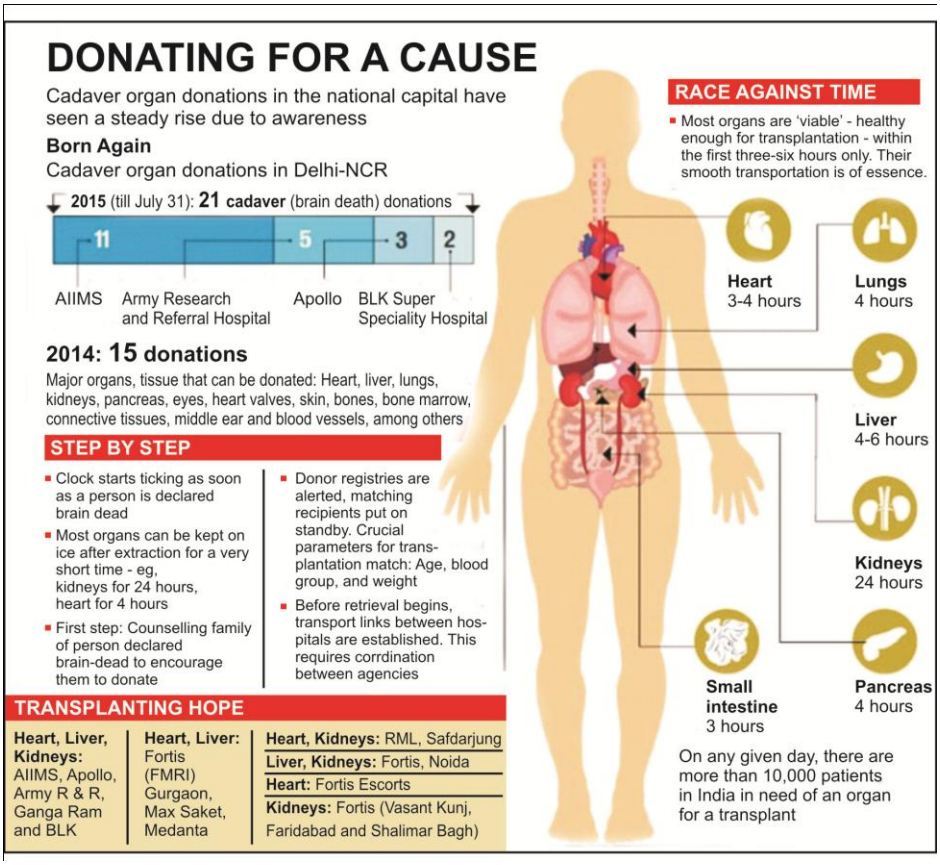


Fig 11: Summary of organ Donation

For instance, it should be made mandatory for all hospitals to ascertain and certify brain-death cases. Once a patient is certified brain-dead, multiple organs including heart, kidney, lung, liver, pancreas and tissues can be harvested and transplanted to the needy patient. The Government has set up a National Organ and Tissue Transplant Organisation (NOTTO), a national level body, to function as apex centre for coordination and networking for procurement and distribution of organs and tissues and their registry. So far, 100 super-specialty hospitals from across the country have enrolled with it, giving details of their organ transplantation activities.

We must continuously strive towards increasing donation rates. We in India need to develop a system which is neither dogmatic nor coercive but equitable and transparent. This will be a slow and difficult process that may also require linking to the bigger struggle for an advanced and yet affordable healthcare system for all.

References

- www.donatelifeindia.org
- www.scientificamerican.com
- www.eurostemcell.org
- www.notto.nic.in

Sample Questions

1. Reflect the all possible reasons for unawareness in general public regarding donation of vital organs. (5)

2. Enumerate the suggestive norms and strategies to be used for organ and tissue donation. (5)

Marking scheme

1. (i) Lack of knowledge about the biological functioning of the body. (1)

   (ii) Less publicity by govt and non-govt agencies (1)

   (iii) Parents do not explain about it to their children due to psychological fear (1)

   (iv) Rare articles in newspapers and magazines regarding recycling of organs. (1)

   (v) No such units in hospitals like blood banks (1)

2. (i) There should be essential certification of brain deaths in private as well as public hospitals. (1)

   (ii) Relatives of living and cadaver donors should be counselled to donate the organs. (1)

(iii) Laws of transplantation and donation should be strictly followed to give preference to the needy patients of wait list. (1)

(iv) Toll Free helpline numbers of green corridors and organ donation centres should be pasted at specific places in private and public healthcare centres. (1)

(v) Strict action should be taken against the organ trafficking. (Human trafficking and transportation control Act 2007. (1)

OPEN TEXT BASED ASSESSMENT 2016-17

Biology (044) Class - XI

Theme 2: 'Learn to live well'

Learning objectives

- To understand that good health is central to human happiness and well-being.
- To relate the cause of some common hormonal disorders with the lifestyle.
- To evaluate his/her own lifestyle and improve it for living well.
- To formulate a diet chart and an exercise regime for himself/herself and his/her family members for healthy living.
- To appraise that healthy society makes an important contribution to economic progress of the nation.
- To appreciate the contribution of government for well-being of the society.
- To understand his/her responsibility and be the agent for the change in the society.
- To spread awareness in society about the importance of leading a healthy lifestyle.

A note to readers

Following text passage is designed for helping the learners understand the importance of well-being. Its purpose is capacity buildingof learners to evaluate their lifestyleand improve it. Two hormonal disorders - diabetes mellitus and Thyroidism, which are cause of concern in the modern world and can be prevented, have been taken as examples. The focus is on understanding of causes and symptoms of these disorders rather than memorizing them. It will help the learner relate these causes and symptoms with his/her own life and/orwith the life of his/her relatives or friends. The teacher is expected to follow a discussion approach so as to help the learners relate the text with life. Teacher should encourage the learners to discuss the related cases from family or friends in the class for better understanding of concepts. The learner should evaluate his/her lifestyle and formulate strategy for dietary and lifestyle changes for living well. Two sample questions have been included at the end of the text. The teacher should design and discuss some more questions which are open ended and the answers to which should not be directly available in the text.

OPEN TEXT BASED ASSESSMENT 2016-17

Biology (044) Class - XI

Theme 2: 'Learn to live well'

Abstract

Everybody in this world is striving hard for personal and professional growth. In this race for progress, somewhere we are forgetting to take care of our health and well-being. Becoming rich does not necessarily mean better quality of life. In order to live well, we should live a healthy and balanced life. In this text, we will focus on some of the common hormonal disorders such as diabetes and thyroid disorders, which have become a challenge for the world including India and can be prevented by change in the lifestyle.

"The ultimate goals of life namely virtue (dharma), wealth (Artha), enjoyment (Kama) and salvation (Moksha) can be enjoyed only by achieving optimum health."

These are the words of Charaka, the father of medicine and author of the famous medical treatise Charaka Samhita.

"Better health is central to human happiness and wellness. It also makes an important contribution to economic progress, as healthy populations live longer, are more productive and save more." "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."-WHO

Wellness refers to enhanced quality of life. Wellness of a human being is influenced by nutrition, physical activity, healthy physical and social environment.

Wellness is important not only for prosperity of an individual but also for a prosperous nation. Policies of a nation and its budget allocations can reflect the vision of its government for its citizens' well-being. Let us analyse India's position and the efforts being made in this context by a closer look at some sections of budget 2016 - 17.

India has been ranked 70th among 145 countries in terms of 'well – being' Index. At present India is home to 194.6 million malnourished people (UN Report) who comprise over 15 percent of its population. If we see it in global context, around 25 percent of world's malnourished people (795 million) live here. While developing strategies to steer India towards growth and development, Government of India has increased its investment on nutrition by 1.4% to reduce the number of malnourished people. Integrated Child Development Scheme and Mid-Day Meal Scheme of Government of India are some of the schemes to tackle malnutrition and health problems in children and provide free lunch to school going children on all working days respectively. More money is now transferred to states as untitled funds so as to give greater freedom to states to set their own priorities.

Social sector, healthcare and education appear high in key priorities of the Government. There is an overall increase in social sector allocation. Overall budget allocation in fiscal year 2016-17 for health, including AYUSH (Ayurveda, Yoga and naturopathy, Unani, Siddha and Homeopathy) is Rupees 39,532.55 crore or 13% higher than previous financial year. Central Government Health Scheme of the Government provides comprehensive medical care facilities to central government employees and their family members. Education has been listed as one of the nine pillars of budget with an allocation of Rupees 72,394, which is 4.9% higher than previous budget.

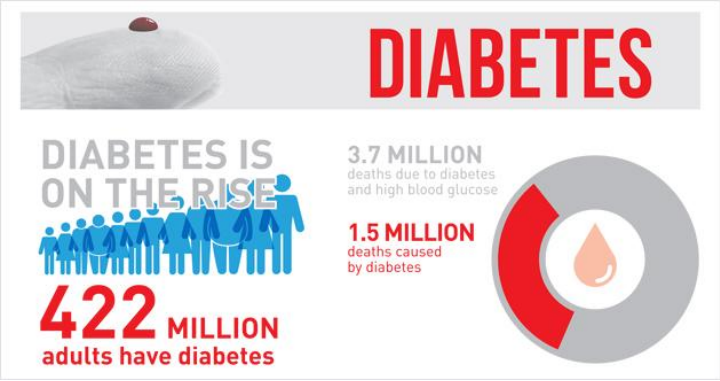
Not only in India, nutrition, health, social sector and education are top priorities for all nations all over the world but still the index of health and wellness is not very high globally also.The data in this regard have proven that more leverage should be given for improvement in health and well-being of populations at global levels. Technical and financial support can be productive only if there is a positive change in attitude towards health and wellness. It has been rightly said -

"There is no knowledge so hard to acquire as the knowledge of how to live this life well and naturally." — Michel de Montaigne

Celebration of '**The World Health Day'** on April, 07 every year by World Health Organisation (WHO) is an initiative at global level to spread awareness about health and wellness. WHO organises international, regional and local events on this day on a particular theme. This year the focus is on Diabetes mellitus.

'Action needed to halt rise in diabetes- Beat Diabetes' was the theme of World Health Day for 2016. Try to find out the theme of World Health Day for last five years.

Diabetes mellitus is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation. Its prevalence has been rising more rapidly in middle- and low-income countries. WHO projects that diabetes will be the 7th leading cause of death in 2030! We have to act today for stopping this to happen! Let us understand how can we do this…



Diabetes mellitus is a chronic disease that occurs mainly due to inability of pancreas gland to produce enough insulin or inability of the body to effectively use the insulin. Insulin is a hormone that regulates blood sugar level. A major indication of diabetes is hyperglycaemia, or raised blood sugar.

Try to recall the location and functions of Pancreas gland in the human body. Is it an exocrine or an endocrine gland?

Diabetes mellitus is mainly of two types: Type 1 and Type 2.

Type 1 Diabetes mellitus (previously known as insulin-dependent, juvenile or childhood-onset) results from the autoimmune destruction of the insulin producing beta cells in the pancreas (Figure 1). It leads to lack of Insulin and increased glucose in blood and urine. It requires daily administration of insulin for survival. The cause of type 1 diabetes is not fully known. Its symptoms are frequent urination (polyuria), increased thirst (polydipsia), increased hunger (polyphagia), weight loss, vision changes and fatigue. These symptoms may occur suddenly.

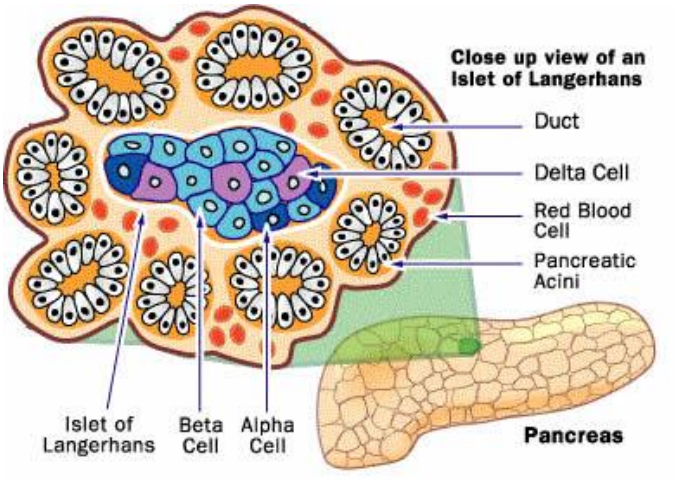
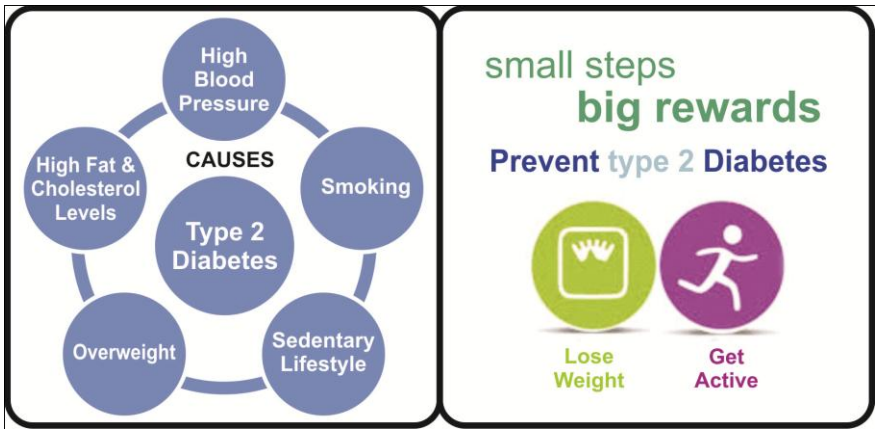


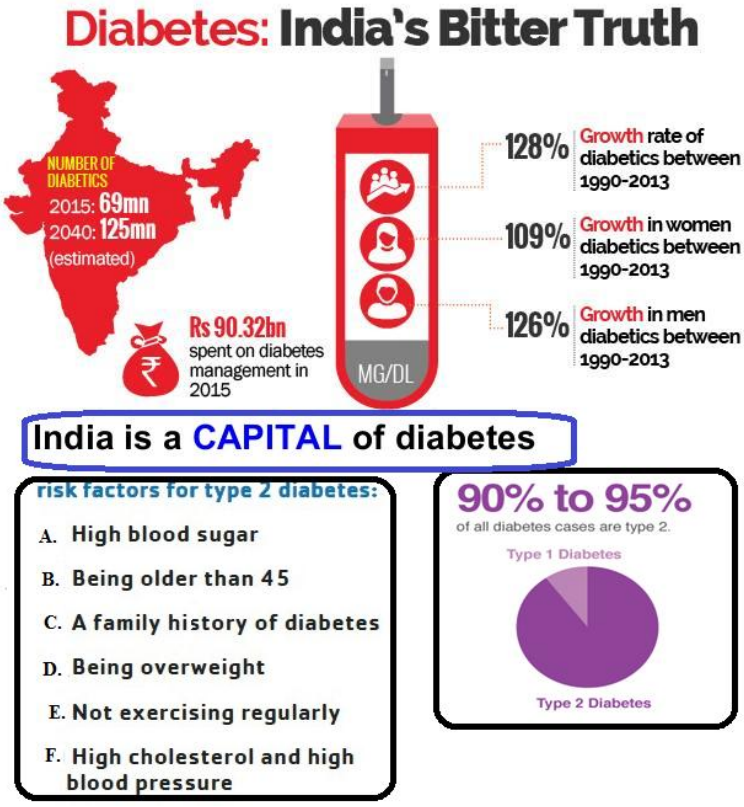
Fig 1: Microscopic view of the section of pancreas

Type 2 diabetes (formerly called non-insulin-dependent or adult-onset) results from the body's ineffective use of insulin. It occurs mainly due to of excess body weight and physical inactivity.Type 2 diabetes comprises the majority of people with diabetes around the world. 90% cases of diabetes are type 2 diabetes, whereas only 10% cases may be of type 1 diabetes. Symptoms of type 2 diabetes are similar to those of type 1 diabetes, but are often less marked. As a result, the disease may be diagnosed several years after onset, once complications have already arisen.



Government of India is also making efforts to educate people about diabetes and prevent it. The central government has proposed to supplement the efforts of state governments by providing technical and financial support through National Program for Prevention and Control of Cancer, Diabetes, CVD and stroke(NPCDCS).

Success of any program depends on the willingness of all the stakeholders to implement it. Government can educate people but the onus of successful implementation lies on each one of us. A number of lifestyle factors such as reduced physical activity, obesity, fast food, sweetened drinks, high blood pressure, tobacco, alcohol intake and stress lead to serious complications and inevitably diabetes. It can thus be prevented by change in the lifestyle and dietary habits. Let us analyse and improve our lifestyle and diet today and ensure healthy living for tomorrow.



Let us accept the challenge to beat diabetes naturally and live well!

Another major health challenge being faced worldwide including India is prevention of thyroid disorders. Common disorders related with thyroid glands are hyperthyroidism, hypothyroidism and goitre.As per the estimates of World Health Organisation, over 200 million people in world and around 42 million people in India suffer from these disorders. Let us try to understand the cause of thyroid disorders and their prevention.

Try to recall the location and functions of thyroid gland. Thyroid is a butterfly shaped gland located in the neck, its two wings are represented by the left and right lobe (Figure 2). It utilises iodine

from the food to make two hormones – Triiodothyronine (T3) and Thyroxine (T4) which regulate the rate of metabolism and thus the energy level in the human body. The production of T 3 andT4 hormone by thyroid glands is regulated by Thyroid Stimulating Hormone (TSH) released by Pituitary gland. For being well, it is important that the T3, T4 and TSH levels are normal (Euthyroidism). If any of these hormones is not within the reference range, the person may suffer from any of the following disorders –

Thyroid disorder	T3 and T4 level	TSH level
Hypothyroidism	Low	High
Hyperthyroidism	High	Low
Subclinical Hypothyroidism	Normal	Mildly elevated
Subclinical Hyperthyroidism	Normal	Low

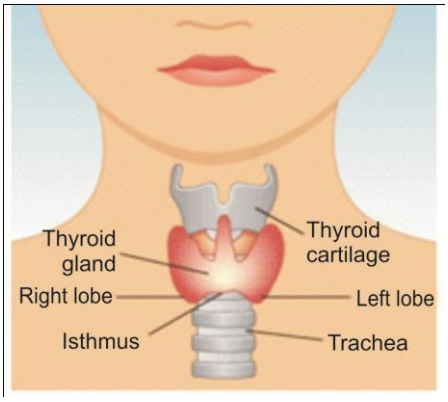


Fig 2: Thyroid glands

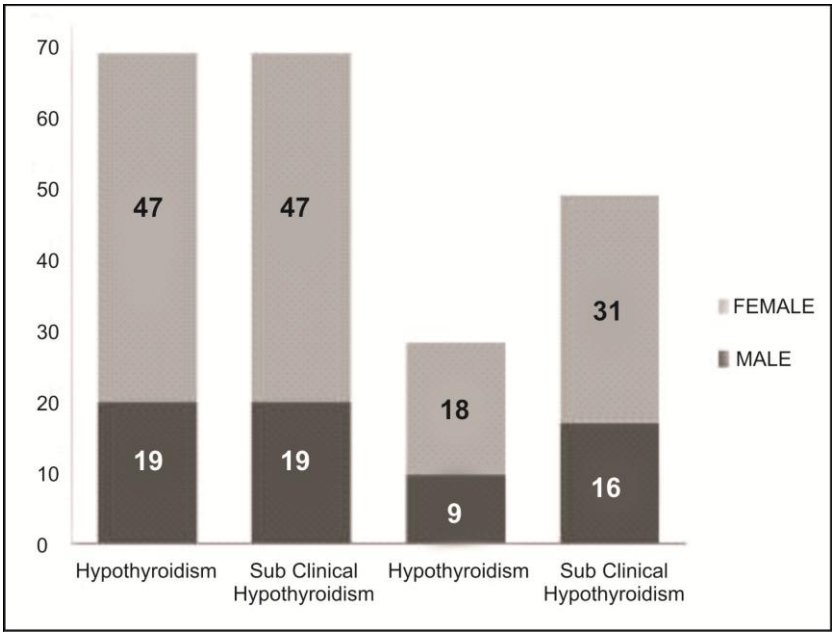
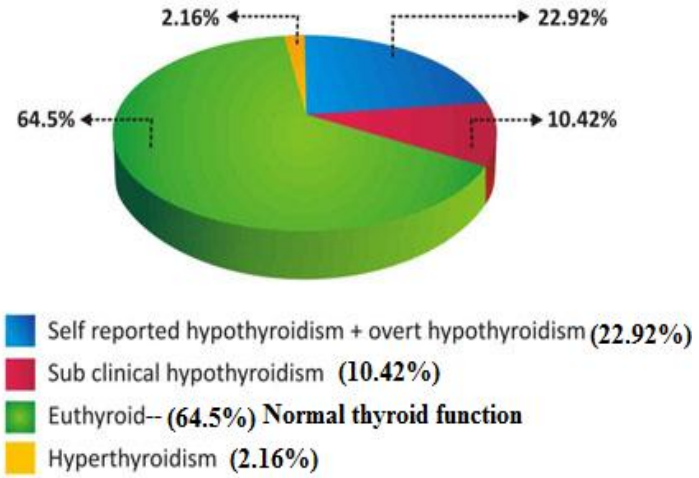


Fig 3: Gender wise prevalence of thyroid dysfunctions

Both hypothyroidism and hyperthyroidism are more common in women than men. Thyroidism is different from other disorders in terms of easy diagnosis and accessibility of treatment.



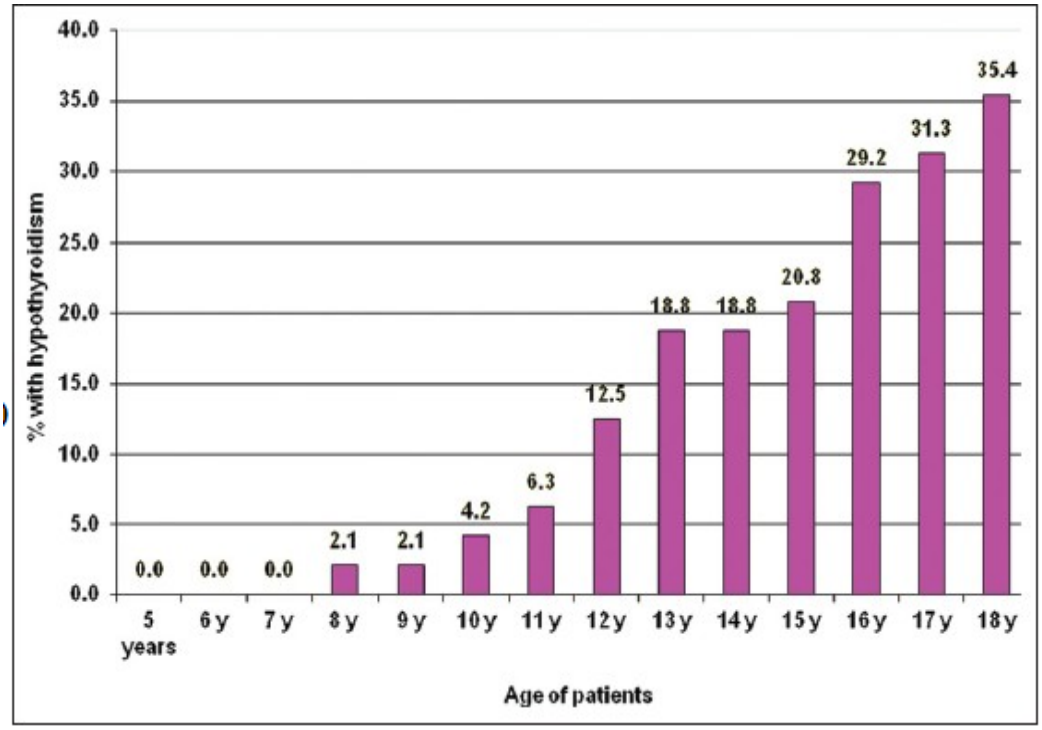


Fig. 4: Prevalence of thyroid disorders

In hyperthyroidism, the thyroid gland becomes overactive and makes excessive amounts of thyroid hormones. It speeds up the body's metabolism and results in nervousness, anxiety, fast heartbeat, intolerance to heat, hand tremors, sleeping problems, diarrhoea and weight loss. The most common cause of hyperthyroidism is Grave's disease, a type of auto immune disease, in which the body makes an antibody called Thyroid stimulating immunoglobin. Another less common cause is eating excessive iodine in food.

Of all thyroid disorders, hypothyroidism is most common. Lack of physical activity coupled with imbalanced diet is pushing more people including youngsters towards underactive thyroid gland also called as hypothyroidism. It has been found to occur in all age groups in India. It may occur due to inflammation of a part of Thyroid gland which damages its cells and thus they become incapable of secreting sufficient hormone. If T3 and T4 levels are low in spite of the fact that pituitary is secreting more and more TSH (hypothyroidism), people will have all the symptoms related with slow metabolism which has an effect on almost every part of our body from heart to brain, muscles and skin. In such cases, the heart rate may be slower than normal, processing of food by intestine may be slower resulting in constipation and weight gain. The extent of symptoms may vary with the severity of the problem.

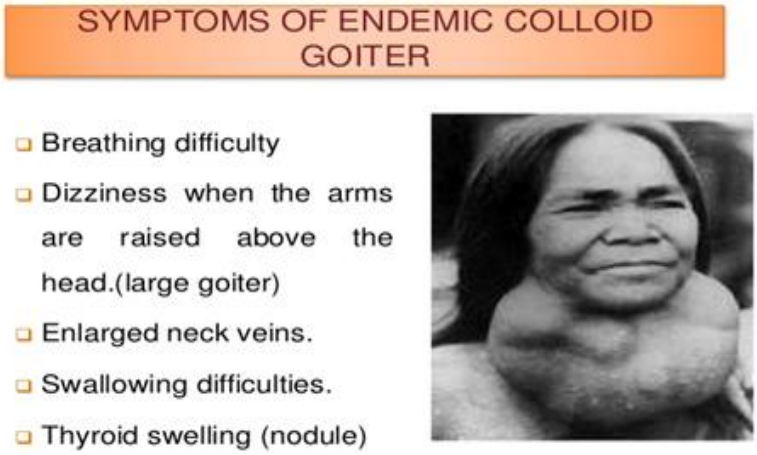
HYPERTHYROID	HYPOTHYROID
Nervousness, anxiety	Fatigue, weakness and depression
Diarrhoea	Constipation
Weight loss	Weight gain
Rapid heartbeat	Slow heartbeat
Oily skin	Dry skin and hairs
Rapid nail growth	Brittle nails
Heat intolerance	Cold intolerance
Infrequent periods/Menses in females	Heavy periods in females
Sleeping problems and hand tremors	Memory lossand muscle cramps

Stress can aggravate hypothyroidism and vice versa is also true.Weight gain is a common symptom of hypothyroidism.So, how do we prevent this disorder? We all know the importance of exercise for keeping good health, but are we doing enough of it? Exercise can boost energy, decrease stress and help to maintain a healthy weight. Regular exercise and walking should be an important part of lifestyle not only for thyroid patients but for all of us to live well. We should not forget to spare five minutes for deep breathing or meditation to relax our mind. As hypothyroidism makes the body sluggish and tired so proper sleep and healthy diet are also essential to remain fit. We should eat small fibre rich meals like vegetables, fruits, whole grains, proteins and healthy fats. There is no cure for hypothyroidism but regular medicine and healthy lifestyle can help to manage it. Thus eating well and exercising should be a part of our lifestyle to live well.

When thyroid gland produces too much of thyroid hormone (hyperthyroidism), healthy diet can help to limit mild hyperthyroidism symptoms. Cruciferous vegetables such as cauliflower, cabbage, food rich in vitamin D like egg, mushrooms, fish; protein and calcium rich diet such as beans, milk, cheese, yogurt, nuts and antioxidant rich food such as strawberries can be included in diet.

Iodine deficiency disorders (IDD) such as goitre constitute the single largest case of preventable brain damage worldwide. In India, entire population is prone to such disorders due to deficiency of Iodine in soil and consequently the food derived from it. According to WHO, the daily value for iodine for adults and children older than four years is 150 mcg and for pregnant women, it is 250 mcg per day. Iodine is present in fruits and vegetables, but its amount is very small in general, for example around 3mcg per serving in banana and apple as compared to 99mcg in 3 ounces of baked cod or 75mcg in 1.5 gm of iodised salt.An estimated 350 million people in India do not consume adequately iodised salt and are therefore at risk.

Endemic goitre which results from iodine deficiency is very common in the Himalayan regions of India, Bhutan and Gangetic belts. The prevalence of goitre is high in Maharashtra (11.9%) and West Bengal (9%) and in many other states surveyed it was around 4%. Prevalence is higher in rural areas than in urban areas in many states. In goitre, the thyroid gland enlarges and the symptoms may include hoarseness, coughing, difficulty in breathing and swallowing. To combat the risk of IDD, salt is fortified with Iodine.IDD control programme in India is one of the success stories of public health in the country. Currently 91 percent households consume iodised salt in India, of which 71 percent is adequately iodised. Target of reaching to remaining population is not a difficult task, if we all follow it as a mission approach to spread the awareness. Find out which other diet can help IDD patients to overcome their iodine deficiency.



Everybody in this world is striving hard for personal and professional growth. In this race for progress, somewhere we are forgetting to take care of our health and well-being. Becoming rich does not necessarily mean better quality of life.In order to live well, we should live a balanced life. We need to take out some time from our busy schedule to learn more about our body and keeping it well. We not only need to take care of our physical health, diet and exercise but we have to maintain a balance between mind, body and spirit. Humour, music, yoga and meditation can help to relax our mind. With increasing competition for excelling in our life, balancing between these three aspects is the challenge that all of us are facing today. If each one of us is determined to bring the change in our attitude to face this challenge, the world will change automatically. “Be the change that you wish to see in the world.” – Mahatma Gandhi. So, let us awaken our selfand take action today for a better tomorrow and learn to live a better life.

Sample questions

1. Suggest five measures that can be taken at global level for the prevention and control of diabetes and its complications. (5)

2. Being rich does not necessarily mean living a healthy life. Justify the statement. (5)

Marking scheme

1.

- Providing scientific guidelines to prevent and manage diabetes and recommendations for governments, individuals, the civic society and the private sector;
- Developing norms and standards for diabetes diagnosis and care;
- Building awareness on the global epidemic of diabetes;
- Conducting surveillance of diabetes and its risk factors;
- Developing a global strategy on healthy diet, regular physical activity, managing body weight and health. Or other suitable points. (1 x 5 = 5)

2.

- Richness can bring money and comforts but what is more important for being well is a balanced and healthy life. Thus, it is not the richness in terms of money but it is the healthy lifestyle which decides the quality of life.
- Factors such as diet and physical activity influence our well-being.
- If we are leading a sedentary lifestyle and are not eating healthy food, a lot of complications such as obesity, high blood pressure, diabetes and hypothyroidism may come up and affect our health and well-being.
- Stress is also another important cause of such complications.
- Yoga, meditation, humour and/or music should be the part of our lifestyle to keep our mind relaxed so as to live well. (other relevant points)

References

- http://www.who.int/campaigns/world-health-day/2016/en/
- http://zenhabits.net/live/
- http://www.humankinetics.com/excerpts/excerpts/the-importance-of-health-fitness-and-wellness
- http://www.endocrineweb.com/conditions/hypothyroidism/4-lifestyle-tips-hypothyroidism?page=1

CENTRAL BOARD OF SECONDARY EDUCATION

Shiksha Kendra, 2, Community Centre, Preet Vihar, Delhi-110092 India

Tel: 011-22509256-57 • Website: www.cbse.nic.in