ZOiON

OCTOBER 2020 | ISSUE 04

THERAPEUTIC ROLE OF MEDICINAL PLANTS IN THE MANAGEMENT OF DIABETIC COMPLICATIONS

DR. MINI S.

HEALTH IS A RELATIONSHIP BETWEEN YOU AND YOUR BODY

UNKNOWN

DEPARTMENT OF ZOOLOGY
KKTM GOVT. COLLEGE, PULLUT, KODUNGALLUR

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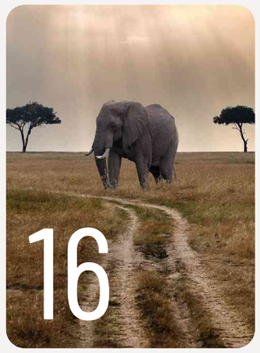

(For private circulation only)

Dr. Seema Menon
Assistant Professor of Zoology

Dear readers,

We welcome you to the fourth issue of "Zoion", our monthly newsletter, which has been initiated as a platform to pen down and share many catchy and relevant topics in the realm of Zoology. Ranging from the magical molecules of life to the vast arena of species inhabiting the living world, there are millions of information to be shared, billions of observations to be made yet and trillions of ideas to bloom up in the subject. "Zoion" is thus a stage for the budding zoologists to bring forth interesting pieces of their knowledge liberally with free minds and fully inked pens.

We present this issue before you, whose main attraction is a coverage on the recommended nutritional habits for young women, so as to build up a healthy generation, and thus, a healthy nation. Women play a key role in healthy nutrition of the population. The woman lactates for the newborn baby and generally prepares food for her family members. Women are also involved in food manufacturing, trade, public catering, health care and education account for the majority. Moreover, public health depends upon women's understanding of proper nutrition. Well-nourished women cater to their own needs as well as take good care of their children, and their families. Properly nourished mothers bear infants with healthy birth weights, who less likely to be malnourished. Women's role is therefore crucial in implementing a healthy nutrition policy, both in the family and in society as a whole.

Apart from the above, we are glad to open up before you, a few more pockets of interesting zoological info congregated by our team with their collective efforts and innovative and fresh ideas. Hopeful of evoking curiosity among our readers, we thank all the contributors, teaching and non-teaching faculty, students and Head of the institution for their supports.

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Therapeutic Role of Medicinal Plants in the Management of Diabetic Complications

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Diabetes mellitus (DM) is a complex metabolic disorder characterized by defects in the body's ability to control glucose homeostasis. It is characterized by chronic hyperglycemia with disturbances of carbohydrate, lipid and protein metabolisms. DM results from defects in insulin secretion or is due to reduced response of cells to the insulin produced or both. Diabetes is one of the first diseases described with an Egyptian manuscript from 1500 BC mentioning "too great emptying of the urine". The first described cases are believed to be of type 1 diabetes mellitus; T1DM. Indian physicians around the same time identified the disease and classified it as madhumeha or honey urine noting that the urine would attract ants. The term "diabetes" or "to pass through" was first used in 250 BC by the Greek Apollonius of Memphis. T1DM and type 2 diabetes mellitus (T2DM) were identified as separate conditions for the first time by the Indian physicians Sushruta and Charaka in 400-500 BC with type 1 associated with youth and T2DM with obesity. The term "mellitus" or "from honey" was added by Thomas Willis in the late 1600s to separate the condition from diabetes insipidus which is also associated with frequent urination. Unfortunately, there is no cure for diabetes yet but by controlling blood sugar levels through a healthy diet, exercise and medication, the risk of long-term complications of diabetes can be decreased.

Glucose homeostasis

Glucose is an essential metabolic substrate of all mammalian cells. D-glucose is the major carbohydrate present in the cell for energy production and many other anabolic requirements. Glucose and other monosaccharides are transported across the intestinal wall to the hepatic portal vein and then to liver cells and other tissues. There they are converted to fatty acids, amino acids and glycogen or are oxidized by the various catabolic pathways of cells. Most tissues and organs, such as the brain, need glucose constantly, as an important source of energy. The low blood concentrations of glucose can cause seizures, loss of consciousness and death. On the other hand, long lasting elevation of blood glucose concentration can result in blindness, renal failure, vascular diseases and neuropathy. Therefore, blood glucose concentrations need to be maintained within narrow limits. The process of maintaining blood glucose at a steady-state level is called glucose homeostasis. This is accomplished by the hormone regulation of peripheral glucose uptake, hepatic glucose production and glucose uptake during carbohydrate ingestion. This maintenance is achieved through a balance of several factors, including the rate of consumption and intestinal absorption of dietary carbohydrates, the rate of utilization of glucose by peripheral tissues and the loss of glucose through the kidney tubule and the rate of release of glucose by the liver and kidney. To avoid postprandial hyperglycemia (uncontrolled increase in blood glucose levels following meals) and fasting hypoglycemia (decreased blood glucose levels during fasting), the body can adjust levels by a variety of cellular mechanisms. Important mechanisms are conveyed by hormones, cytokines and fuel substrates and are sensed through cellular mechanisms. Diabetes mellitus is one of the clinical manifestations of long-term metabolic abnormalities involving multiple organs and hormonal pathways that impair the body's ability to maintain glucose homeostasis. The result of impaired glucose homeostasis is hyperglycemia. Prolonged elevation of blood glucose concentrations causes

a number of complications like blindness, renal failure, cardiac and peripheral vascular diseases, neuropathy, foot ulcers and limb amputation. Vascular complications represent the leading cause of mortality and morbidity in diabetic patients.

Prevalence of diabetes mellitus

Diabetes is a major public health issue and the number of diabetic patients is expected to increase by 50% over the next 20 years, posing a tremendous economic burden on individuals and health care systems worldwide. T1DM and T2DM are caused by a combination of genetic and environmental risk factors. However, other rare forms of diabetes are directly inherited. The estimated worldwide prevalence of diabetes among adults in 2010 was 285 million (6.4%) and this value is predicted to rise to around 439 million (7.7%) by 2030. More than 80% of diabetic deaths occur in low- and middle-income countries. WHO projects that diabetes will be the 7th leading cause of death in 2030. Figure.2 depicts worldwide epidemiology of DM. Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco and alcohol use can prevent or delay the onset of type 2 diabetes.

Management of diabetes mellitus

Management of diabetes and maintaining normal plasma glucose levels are of utmost importance in order to prevent the development of diabetic complications such as nephropathy, neuropathy, retinopathy, dyslipidemia and cardiovascular diseases, which are comparatively more lethal.

Diet

Diet therapy is the corner stone of treatment in diabetes, especially for type 2 diabetic patients. It is difficult to maintain dietary control for long periods, but dietary control is important and necessary. Nutrition therapy is an essential component of successful diabetes management. Intake of food high in dietary fiber instead of more rapidly digested forms of carbohydrates improve glycemic control because of the slow release of carbohydrate due to the high fiber content.

Physical Activity

Physical activity has acute and chronic effects on glucose, lipid and protein metabolism. In type 1 diabetic subjects, the lack of physiological inhibition of insulin secretion during exercise results in a potential risk of hypoglycemia. On the other hand, exercise-induced activation of counter regulatory hormones might trigger an acute metabolic derangement in

Insulin

Insulin was discovered by Banting and Best in 1922 completely revolutionizing the treatment of diabetes mellitus. Progress has been made, in recent years, in the production, formulation and delivery of insulin preparations, as well as the development of insulin treatment regimens which maintain long-term- normoglycemia with a low risk of hypoglycemia.

Oral antidiabetic drugs

Oral hypoglycemic agents are important in the treatment of type 2 diabetes mellitus where there are residual functioning

pancreatic β-cells. However, owing to the progressive nature of the disease, oral antidiabetic agents even when used intensively are often unable to control the hyperglycemia.

Diabetes and medicinal plants

Plants have been used in treatment of diabetes mellitus all over the world for centuries. Wide variety of plant derived active principles representing numerous classes of chemical compounds have shown potential for the use in treatment of diabetes. Among the classes of chemical compounds isolated from plants with documented biological activity are phenolics, flavonoids, alkaloids, sterols, glycosides, galactomannan, peptidoglycans. The importance of functional foods, nutraceuticals, phytochemicals and other natural health products has been well recognized in connection with health promotion and reduction in disease risk.

Hyperglycemia resulting from uncontrolled glucose is a link between diabetes and diabetic complications. The link between oxidative stress and glucotoxicity has been suggested by earlier studies in β-cell lines, isolated islets and diabetic animal models showing that antioxidants can protect β-cells against the deleterious effects of high glucose on insulin secretion, insulin gene expression, insulin content and survival. Therefore, it is of great significance to develop effective therapies against oxidative stress and apoptosis in pancreatic β cells induced by hyperglycemia. The rising trend in the prevalence of diabetes and associated complications all over the world suggests that, existing medical treatments for diabetic pathologies are not sufficient and use of supplementary/complimentary treatments such as functional foods and their nutraceuticals may enhance the effectiveness of diabetic management. Herbal drugs are prescribed widely because of their effectiveness, less side effects and relatively low cost. Several medicinal plants have found potential use as hypoglycemic in the Indian system of medicines, including ayurveda. Phytochemicals in can afford protection against various complications associated with diabetes. Research from our lab revealed that Musa paradisiaca, Hibiscus rosa sinensis, Cissus quadrangularis, Ensete superbum, Averrhoa Bilimbi afford protection in diabetes by modulating diabetic complications. Our studies revealed the presence of potent phenolic compounds with diverse pharmacological properties, viz; chlorogenic acid, caffeic acid, syringic acid, p-coumaric acid, ferulic acid, ellagic acid, myricetin and cinnamic acid. Myricetin is a natural flavonoid ubiquitously found in foods including vegetables, fruits, tea, wine and medicinal plants. Ferulic acid is a major constituent of fruits and vegetables such as orange, tomato, carrot, sweet corn and rice bran. Syringic acid is present in olive, walnut, cauliflower, cloves and dates. These phytochemicals are reported to have anti-oxidant, anti-diabetic, hepatoprotective and cardioprotective properties. Since they are naturally occurring in different plant sources, intake of a diet rich in them provide protection against the development of long-term diabetic complications. To date metformin is the only ethical drug approved for treatment of diabetes mellitus derived from a medicinal plant Galega officinalis historically used to treat diabetes. There is every possibility of developing a few useful drugs from medicinal plants with a long history of human use. More researches are needed in order to separate the active components of plants and molecular interactions of their compounds for analysis of their curative properties.

"Young Women: Agents of Change for a Healthy Nation"

Ms. Betty Thomas.
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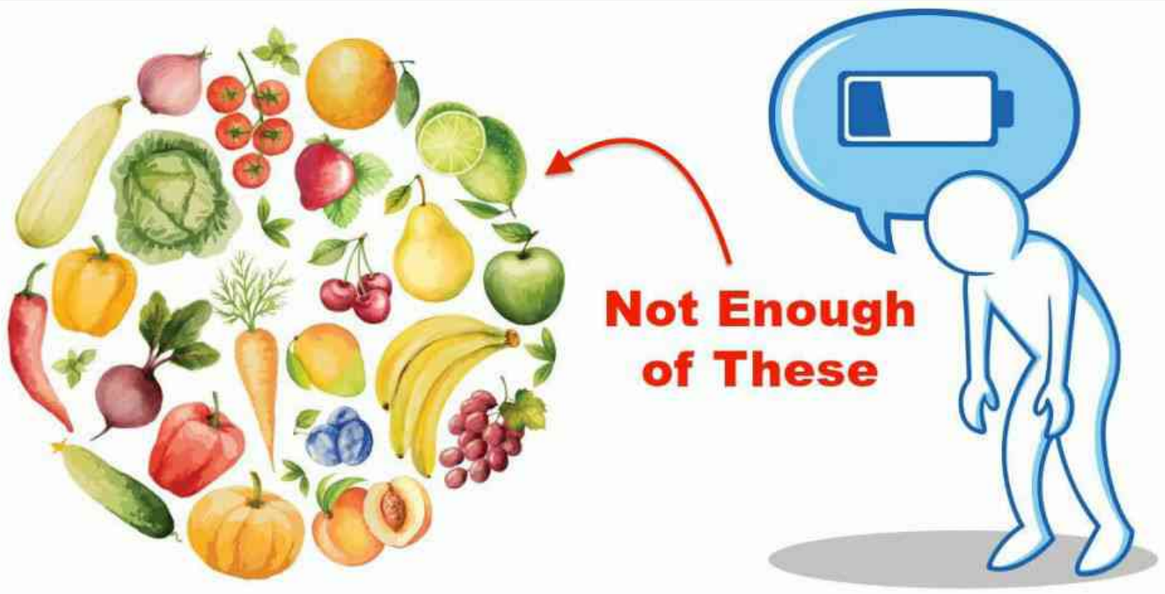
Adolescence is a developmentally dense time of life, with solidification of personal identity, ethical beliefs, approach to the world, patterns of friendships, cognitive sophistication and sexual and gender identity. Young age (adolescence and late adolescence) of a girl is characterized by the growth spurt, a period in which growth is very fast. During this time, physical changes affect the body's nutritional needs, while changes in one's lifestyle may affect eating habits and food choices. Any nutritional deficiency experienced during this critical period of life can have an effect on the future health of the individual and their offspring. Health and nutrition in adolescent girls and young women in low and middle income countries has shown that persistent under-nutrition and anaemia are major problems; obesity is also emerging as a public health problem in adolescents. Important social determinants of health in adolescents include poverty, unemployment levels, income, gender and unawareness about the importance of proper nutrition.

Maternal and child under-nutrition is the underlying cause of 3.5 million deaths annually and accounts for more than a third of the disease burden in children younger than 5. In addition, under-nutrition has intergenerational effects and as a result, countries and populations with higher rates of maternal and child under-nutrition also face deleterious impacts on population and workforce health .We now understand that rates of chronic diseases like diabetes and heart disease can be reduced in future generations if women have access to a nutritious diet before, during, and after pregnancy. Research shows that the origins of many chronic diseases begin during development in the womb and continue during the first few years following conception.

Poor nutrition affects more than half of women in low- to middle-income countries, with anemia averaging 40%. If girls enter the reproductive cycle in a malnourished state, the cycle of maternal malnutrition, fetal growth restriction, infant/child growth faltering, and blunted lifetime productivity is perpetuated. Thus, it is not possible to have a healthy population without adequate nutrition for girls and young women, before, during, and after pregnancy. Years of research have demonstrated the efficacious role of good nutrition in improving the health of mothers and their offspring. Emerging evidence suggests that the health benefits of improved nutrition are particularly robust for adolescent girls. In contrast, pregnancy in early adolescence adversely affects fetal development, leading to low birth weight and preterm birth, and negatively impacts a woman's development if she becomes pregnant before she is fully grown.

Malnutrition in girls and young women also has implications for breastfeeding. Exclusive breastfeeding during the first 6 months of life is recommended by the World Health Organization because it reduces the infant's risk of diarrhea, pneumonia, and mortality from other causes. To ensure optimal nutrient concentrations in breast milk, the mother needs to be well nourished throughout the course of pregnancy and lactation. This highlights the need for sufficient diets for all pregnant and lactating women, especially adolescents and young women with their own competing growth and development needs.

Now a days, Vitamin D deficiency (VDD) is also very common among adolescents and young adults. This vitamin plays an important role in development and maintaining skeletal growth. Vitamin D levels should be properly maintained for metabolism and utilization of Calcium and Phosphorus in the body. Different factors attribute to this deficiency including lack of sunlight exposure due to cultural dress codes and veiling or due to pigmented skin, and less time



spent outdoors, because of hot weather, and lower Vitamin D intake. Adolescents with severe VDD may present with vague manifestations including pain in weight-bearing joints, back, thighs and/or calves, difficulty in walking and/or climbing stairs, or running and muscle cramps. Adequate Vitamin D replacement after treating VDD, improving Calcium intake (milk and dairy products), encouraging adequate exposure to the sun and possible enrichment of the stable food with Vitamin D in areas with high prevalence of VDD are important measures to prevent the harmful consequences of VDD.

The nutrition transition has brought about rapid changes in the structure of traditional diet in all countries and it has also affected the Indian diet. The replacement of traditional home-cooked meals with ready-to-eat, processed foods has contributed to an increased risk of chronic diseases in urban Indians. Improving the nutrition of Indians by promoting healthy food consumption in early life and in adolescence would help to reduce these health risks.

Adolescents and young girls tend to eat differently than they did as children. Preoccupied with after-school activities and engagement in active social endeavors, adolescents are not always able to sit down for three meals a day. These apparent busy schedules may lead to meal skipping, throughout eating a day, improper timings, more eating away from home. Fast foods tend to be high in fat and sugar and they provide little nutritional value. More importantly, eating too many fast foods can lead to weight gain and which may predispose one to diseases such as diabetes and heart disease. Eating patterns and behaviors of adolescents are affected by many factors like peer influences, parental modeling, easy availability of food, cost of food, convenience eat and carry food items, personal and cultural beliefs, mass media, body image etc.

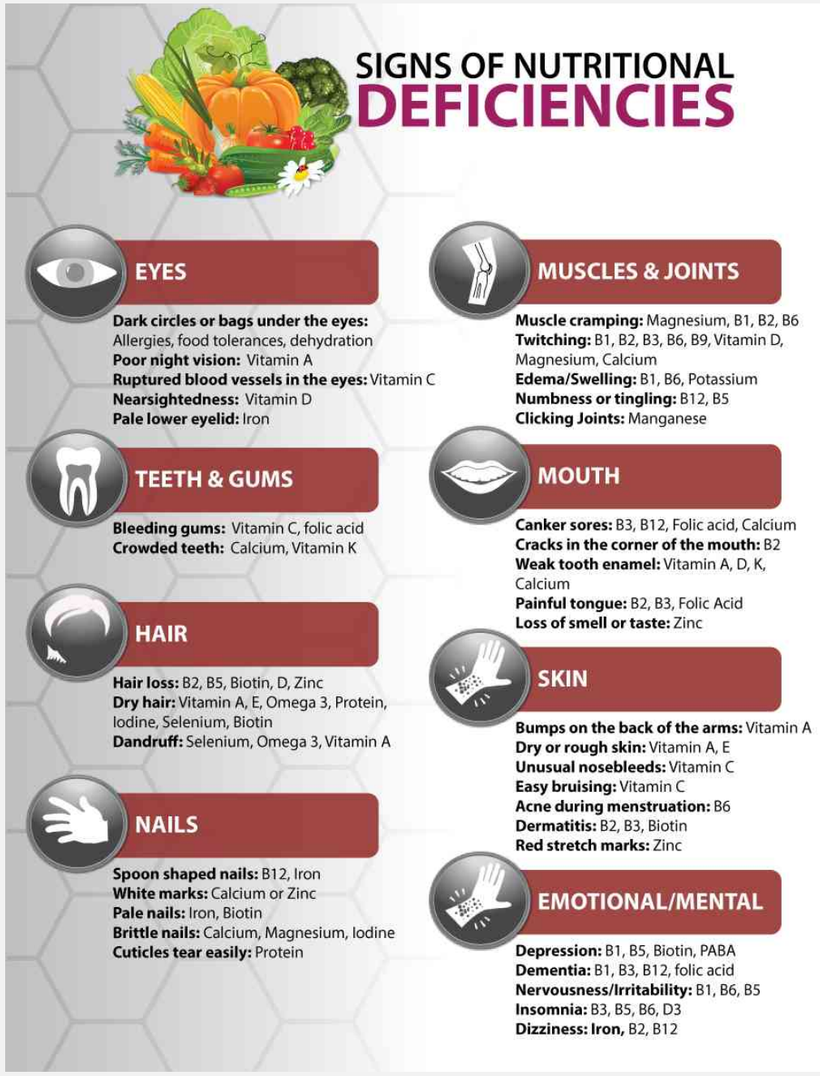
Young women and adolescent girls among following groups comes under high risk category for nutritional deficiency disorders.

• Pregnant and lactating adolescents -When a teenager becomes pregnant, she needs more nutrients than her non-pregnant colleague to support both her baby and her own continued growth and physical development.

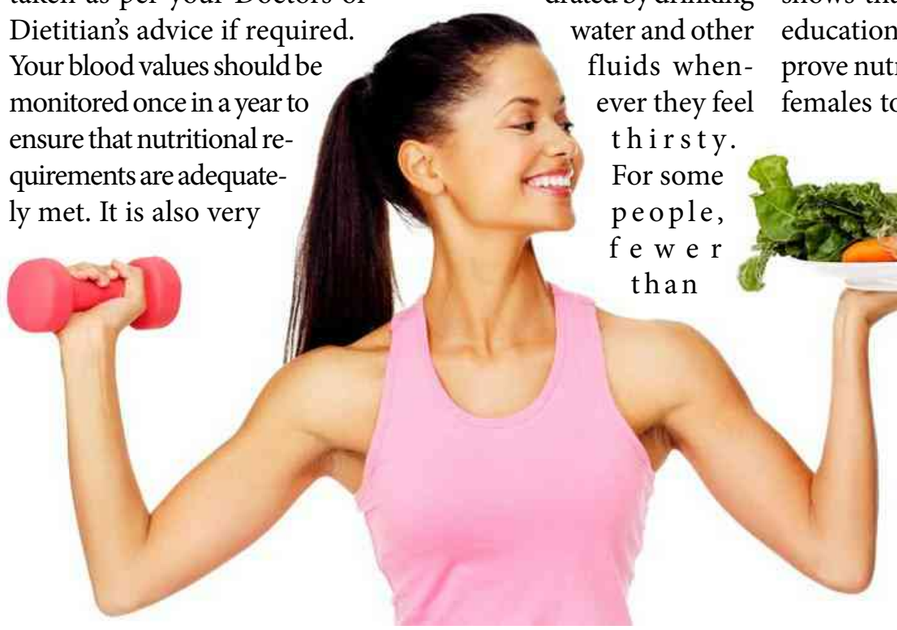
• Athletes and Celebrities - Some young athletes and people having celebrity status may be tempted to adopt unhealthy behaviors such as crash dieting, taking supplements to improve performance, or eating unhealthy foods to fulfill their hearty appetites.

• Vegetarians - Strict vegetarians (those who do not eat eggs or dairy products), also known as vegans, may need nutritional supplements to meet their needs for Calcium, Vitamin B12, and Iron.

For a young woman to be healthy, their diet should consists of 50% of fruits and vegetables which supply enough vitamins and minerals, 25% of whole grains and millets which supplies calories, 20% pulses, milk, egg or any meat products to meet daily protein requirements. Sugars and fats should be consumed in limited amounts. Fat requirements should be met by consuming healthy nuts (Peanuts, Almonds, Cashews, coconut), dried seeds(Sunflower seeds, Pumpkin seeds, Sesame seeds etc.) and natural oils such as Coconut oil, Mustard oil, Sesame oil ,Olive oil etc. and it should be only 5% of total calorie requirement per day.



Fibre should be supplied for adding bulk to the diet. Multi-vitamin tablets or any other nutritional supplements can be taken as per your Doctors or Dietitian's advice if required. Your blood values should be monitored once in a year to ensure that nutritional requirements are adequately met. It is also very important to take care that the nutrients values are not above the normal range, which may lead to severe other health problems. Water does more than just quench your thirst and regulate your body's temperature. Your body depends on water to survive. Every cell, tissue, and organ in your body needs water to work properly. For example, your body uses water to maintain its temperature, remove waste, and lubricate your joints. An intake of minimum 8 glasses will help to maintain your health. However, different people need different amounts of water to stay hydrated. Most healthy people can stay well hydrated by drinking water and other fluids whenever they feel thirsty. For some people, fewer than 8 glasses may be enough. Other people may need more than 8 glasses each day. Water is needed for overall good health. Daily 30-45 minutes of physical exercise should be done for 3-4 hours per week to maintain good health.



Adolescent girls need access to information and services related to nutrition, reproductive health, family planning, and general health. Programs can reach girls through a variety of avenues, including schools, workplaces, marriage registration systems, and youth-oriented health programs. Schools can be a key part of helping adolescent girls become healthy adults: Research shows that promoting female education and literacy can improve nutrition and encourage females to seek regular health care. Ensuring that adolescent girls receive enough food, iron and folate supplements, and iron and iodine-fortified foods, as well as helping them delay their first pregnancy and protect themselves from sexually transmitted infections and other to fight diseases, can help girls become healthy women. Teaching girls to use their knowledge of nutrition when preparing and handling food can also improve their health and that of their families.

In communities where many adolescent girls are underweight, supplements may improve girls' overall health and their pregnancy outcomes, including reducing their risk of bearing low birth-weight babies. Interventions that reach adolescents help to establish healthy habits that continue into adulthood. Such programs should also involve males: Boys who receive information about women's increased nutritional requirements during pregnancy and lactation may be better partners when they form families.

Efforts to improve the nutrition of entire populations do benefit women, and governments can use a variety of approaches to ensure that their citizens receive enough calories and nutrients. Teaching people about local foods, such as mangos, papayas, and chicken livers, contain essential nutrients can help to diversify diets. Programs can also improve nutrition by fortifying widely consumed staple foods to deliver iron, iodine, vitamin A, and other micronutrients to large populations. Agricultural policies that promote the production of nutritionally rich crops and techniques that add nutritional value to foods. Availability of clean water and improving sanitation to prevent the transmission of intestinal parasites that can exacerbate existing malnutrition.

The health of adolescents and young adults is gaining new attention globally with growing appreciation of the importance of adolescence within the life course. Sexual and reproductive health remains a major problem in many Low Middle Income Countries (LMIC). Under-nutrition remains an issue in adolescents in many parts of the world, the epidemic of overweight and obesity, vitamin deficiencies are increasingly affecting adolescents in LMIC. Adequate nutrition is important for women not only because it helps them to be productive members of society but also because of the direct effect of maternal nutrition has on the health and development of the next generation.

Enigmatic wildlife

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Wildlife traditionally refers to the undomesticated animal species, but has to come to include all living organisms (plants, animals, microorganisms) in their natural habitat which are neither cultivated or domesticated nor tamed. Wildlife can be found in all ecosystems including deserts, forests, rainforests, plains, grasslands and other areas including the most developed urban areas. For maintaining a healthy ecological balance on this earth, animals, plants and marine species are as important as humans. Each organism on this earth has a unique place that contributes to the ecosystem in its own special way.

Wildlife plays an important role in balancing the environment, which provides stability to different process of nature. It plays an indispensable role in maintenance of complex, healthy ecosystems, which are in turn indispensable for the maintenance of human life. Wildlife and nature have been largely associated with humans for emotional and social reasons. Wildlife plays an essential role in the ecological and biological processes that are yet significant to life. The normal functioning of the biosphere depends on endless interactions among animals, plants and microorganisms including events such as pollination, germination, soil generation, nutrient cycling, habitat maintenance etc.

Beside this, wild life also contributes to science, medicine and agriculture. The development of new drugs and treatments are largely dependent on wild life and wildlife habitat. Today, most medicinal remedies contain at least one ingredient derived from wild plant or animal source. For instance, one of the Australian amphibians, the red-eyed tree frog (Litoria chloris) and its relatives provide a peptide that can helps in preventing HIV infection. Animal studies have led to the development of tamoxifen, one of the most successful treatments, and more recently Herceptin (trastuzumab) and aromatase inhibitors.

Beyond this wild life tours contribute a lot to the tourism sector and the funds raised by them boost the economy.

But sadly, today the existence of many species of animals is endangered. The natural habitats of the plants and animals are being destroyed for land development and farming by humans. Poaching and hunting of animals for fur, meat and leather are also factors contributing to wildlife extinction. Overexploitation, habitat destruction and fragmentation, impact of introduced species etc also lead to species extinction.

Unless stringent steps are taken to protect wildlife, it would not be long when most of them will find a place in the list of extinct species. The extinction of wildlife species will certainly have a fatal impact of human race as well. So, it becomes a great responsibility to save the wildlife, our planet and most importantly, ourselves.

Steps are initiated now for wildlife conservation and the preservation, protection, and restoration of the endangered species along with their habitat. The aim of wildlife conservation is to ensure that nature will be there for the future generations to live in. In addition, spreading awareness on the importance of wildlife to human beings is inevitable. When we conserve the natural habitat of wild life species, we enrich our planet. To help protect wildlife it's important to understand how species interact within their ecosystem and how they are affected by environment destruction.

There are many government agencies who have implemented policies designed to protect wildlife conservation. Numerous organizations also do independent programmes to promote the conservation of wildlife. All over the world, many wildlife conservationists work to identify species, which are in need of help. They often capture animals and breed them in captivity. This is to make the population large and diverse. As of 2018-'19, there are 870 protected area including 104 national parks, 551 wildlife sanctuaries, 88 conservation reserves and 127 community reserves covering a total of 1,65,088.57 km2 of geographical area, which is approximately 5.02% of the country.

Humans are considered as intellectual beings having the conviction to react positively to emergencies. It's our urgent responsibility to take necessary steps to protect and conserve wildlife. It becomes important to disseminate this awareness to the common public.

ALPHABETimals

G Giraffe

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Giraffe, any of the four species in the genus Giraffa is a long-necked cud-chewing hoofed mammal of Africa, with long legs and a coat pattern of irregular brown patches on a light background. Giraffes are the tallest of all land animals; males (bulls) may exceed 5.5 metres (18 feet) in height, and the tallest females (cows) are about 4.5 metres. Using prehensile tongues, almost half a metre long, they are able to browse foliage almost six metres from the ground. Giraffes are a common sight in grasslands and open woodlands in East Africa, where they can be seen in reserves such as Tanzania's Serengeti National Park and Kenya's Amboseli National Park. The genus Giraffa comprises the northern giraffe (G. camelopardalis), the southern giraffe (G. giraffa), the Masai giraffe (G. tippelskirchi), and the reticulated giraffe (G. reticulata).

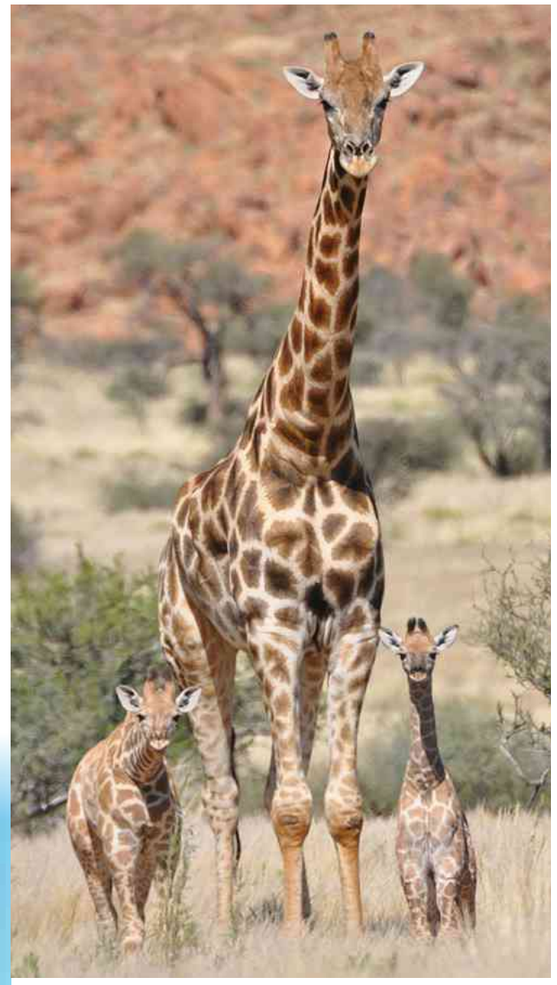
Giraffes grow to nearly their full height by four years of age, but gain weight until they are seven or eight. Males weigh up to 1,930 kg (4,250 pounds), and females up to 1,180 kg (2,600 pounds). The tail may be a metre in length and has a long black tuft on the end; there is also a short black mane. Both sexes have a pair of horns, though males possess other bony protuberances on the skull. The back slopes downward to the hindquarters, a silhouette explained mainly by large muscles that support the neck; these muscles are attached to long spines on the vertebrae of the upper back. There are only seven neck (cervical) vertebrae, but they are elongated. Thick-walled arteries in the neck have extra valves to counteract gravity when the head is up; when the giraffe lowers its head to the ground, special vessels at the base of the brain control blood pressure. The gait of the giraffe is at pace (both legs on one side move together). In a gallop, it pushes off with the hind legs, and the front legs come down almost together, but no two hooves touch the ground at the same time. The neck flexes so that balance is maintained. Speeds of 50 km (31 miles) per hour can be maintained for several kilometres, but 60 km (37 miles) per hour can be attained over short distances.

Giraffes live in non-territorial groups of up to 20. Home ranges are as small as 85 square km (33 square miles) in wetter areas but up to 1,500 square km (580 square miles) in dry regions. The animals are gregarious, a behaviour that apparently allows for increased vigilance against predators. They have excellent eyesight, and when one giraffe stares, for example, at a lion a kilometre away, the others look in that direction too. Giraffes spend most of their lives standing up; they even sleep and give birth, standing up. Giraffes live up to 26 years in the wild and slightly longer in captivity. Giraffes prefer to eat new shoots and leaves, mainly from the thorny acacia tree. Cows in particular select high-energy low-fibre items. They are prodigious eaters, and a large male consumes about 65 kg (145 pounds) of food per day. The tongue and inside of the mouth are coated with tough

tissue as protection. The giraffe grasps leaves with its prehensile lips or tongue and pulls them into the mouth. If the foliage is not thorny, the giraffe "combs" leaves from the stem by pulling it across the lower canine and incisor teeth. Giraffes obtain most water from their food, though in the dry season they drink at least every three days. They must spread the forelegs apart in order to reach the ground with the head.

Females first breed at four or five years of age. Gestation is 15 months, and, though most calves are born in dry months in some areas, births can take place in any month of the year. The single offspring is about 2 metres (6 feet) tall and weighs 100 kg (220 pounds). For a week, the mother licks and nuzzles her calf in isolation while they learn each other's scent. Thereafter, the calf joins a "nursery group" of similar-aged youngsters, while mothers forage at variable distances. If lions or hyenas attack, a mother sometimes stands over her calf, kicking at the predators with front and back legs. Cows have food and water requirements that may keep them away from the nursery group for hours at a time, and about half of very young calves are killed by lions and hyenas. Calves sample vegetation at three weeks but suckle for 18–22 months. Males join other bachelors when one to two years old, whereas daughters are likely to stay near the mother.

Bulls, eight years and older travel up to 20 km per day looking for cows in heat (estrus). Younger males spend years in bachelor groups, where they engage in "necking" bouts. These side-to-side clashes of heads cause mild damage, and bone deposits subsequently form around the horns, eyes, and back of the head; a single lump projects from between the eyes. Accumulation of bone deposits continues through life, resulting in skulls weighing 30 kg. Necking also establishes a social hierarchy. Violence sometimes occurs when two older bulls converge on an estrous cow. The advantage of a heavy, knobbed skull is soon apparent. With forelegs braced, bulls swing their necks and club each other with their skulls, aiming for the underbelly. There have been instances of bulls being knocked off their feet or even rendered unconscious.



Giraffes were traditionally classified into one species, Giraffa camelopardalis, and then into several subspecies on the basis of physical features. Nine subspecies were recognized by coat pattern similarities; however, it was also known that individual coat patterns were unique. Some scientists contended that these animals could be divided into six or more species, since studies had shown that differences in genetics, reproductive timing, and pelage patterns (which are indicative of reproductive isolation) exist between various groups. By the 2010s, mitochondrial DNA studies had determined that genetic uniqueness brought on by the reproductive isolation of one group from another were significant enough to separate giraffes into four distinct species. The giraffe had long been classified as a species of least concern by the International Union for Conservation of Nature (IUCN), which places all giraffes in the species G. camelopardalis. A study in 2016, however, determined that habitat loss resulting from expanding agricultural activities, increased mortality brought on by illegal hunting, and the effects of ongoing civil unrest in a handful of African countries had caused giraffe populations to plummet by 36–40 percent between 1985 and 2015, and, as of 2016, the IUCN has reclassified the conservation status of the species as vulnerable.

The number of giraffes in the wild is shrinking as their habitats shrink. In the late 19th and 20th centuries, herds of 20 to 30 animals were recorded, now on an average herd sizes contain fewer than six individuals. The IUCN lists four main threats to this species: habitat loss, civil unrest, illegal hunting, and ecological changes (climate change and habitat conversion). As human populations grow and increase agricultural activities, expand settlements, and construct roads, the giraffe is losing its beloved acacia trees, which are its main source of food.

HERMIT CRAB

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IInd Year B. Sc. Zoology.

Hermit crab is a member of the crustacean group. It is not a true crab since its shell is not fully attached to its body like other crabs. A hermit crab must borrow a discarded shell from other animals. They usually scavenge a shell from other mollusks such as snails.

When seen out of a shell, hermit crabs have a bizarre appearance. The soft abdomen is twisted, which allows it to fit into the coils of the gastropod shell. Most adult hermit crabs are from ½ inch (13mm) to 4 ¾ inches (121 mm) long. The common hermit crab is typically reddish or brownish in color. They have hard skin, gills and two pair of antennae. A hermit crab has round eyes on the end of eyestalks. A hermit crab has five pairs of legs or ten legs in all. Not all of the legs are fully developed. Only six legs are apparently visible. These front six legs are known as walking legs. Hermit crabs keep their four back legs inside their shell. The back legs are much smaller than the walking legs. The front pair of legs in claws, or pinchers. The left front leg is usually larger than the right claw and has a large pincher. The crab uses this large pincher for moving around and defending itself, while hiding inside its shell. It uses this pincher to seal off the shell opening. The right front leg has a smaller pincher which the crab uses to eat and drink. Hermit crabs have soft stomachs or abdomens, which are easily gobbled up by birds or small animals as they come ashore.

They enjoy worldwide distribution and mostly occur in sandy or muddy-bottomed marine waters, occasionally on land and in trees. Hermit crabs are both herbivorous (plant eaters) as well as scavengers. In the wild, hermit crabs feed on animal and plant remains, overripe fruits and dropping from others animals. In its life cycle, a hermit crab starts out as an egg which is laid in the ocean. While in the ocean, the eggs hatch. At first, they look like brine shrimps. They stay in the ocean growing slowly until they resemble their parents and can climb back on land. Once on land, these tiny hermit crabs must find shelter or they will die out of predation. So, for protection, a hermit crab usually lives in a shell. It carries its home wherever it goes. A hermit crab's soft body is naturally flexible can twist easily to fit into the spiral interior of a snail's shell. When it finds a shell, the abdomen of the hermit crab assumes the shape of that shell for most of its life. A crab will prefer shells with the same shape as it is comfortable for it. Some hermit crabs only live for 2-3 months, but some can live up to 20-30 years. They have an exoskeleton or outer skin, which they moult to grow. Moulting is a process of shedding their exoskeleton so they can grow a little. The frequency of moults depends on its size, health and habitat. If it is not living in ideal conditions it will moult less often and if it lives in a good habitat, it will moult whenever it feels like. Hermit crabs grow very slowly, only about a millimeter a year, so they will not need a new shell right after shedding their skin. Moulting has nothing to do with switching shells. Even when a hermit crab does not grow, it switches its shell to a larger one. Hermit crabs seek out abandoned shells for protection from predators. When a hermit crab finds one of the proper sizes, it pulls itself inside leaving several legs and its head outside the shell. Different hermit crabs like different kinds of shells, and they also enjoy "shopping" for shells. Hermit crabs will spend a lot of time checking out new shells. Shell changes take a matter of seconds, depending on the species, and can happen on an almost weekly basis or take months or years. In places where discarded shells are hard to come by, hermit crabs protect themselves with coconut shell, a piece of bamboo, or anything else they may find. Hermit crabs are nocturnal and gregarious in habit (social creatures that do best when they live in groups). In the wild, they may travel in packs of up to hundred crabs, scavenging the beach for food and shells.

If you choose a hermit crab as a pet, it should be kept in mind that they are social creatures. Your hermit crab will enjoy living with other hermit crabs. There are many books that can help you learn to set up the right environment and care for your new pet.

MEDI + TALK

Glaucoma

RAGAV C. S.
IInd Year B. Sc. Zoology.

Glaucoma is a condition that damages the optic nerve of the eye. It is linked to a build-up of pressure inside the eyes. The increased intraocular pressure (pressure in eye), damages the optic nerve, which sends images to the brain. If the damage worsens, glaucoma can cause permanent vision loss or even total blindness within a few years.

Most people with glaucoma have no early symptoms or pain. Periodic eye check-up can help in early diagnosis and treatment since the lowering of eye pressure retains vision, otherwise ending up in long-term vision loss, whose rectification becomes impossible. Most patients who follow their treatment plan and have regular eye exams done are able to keep their vision.

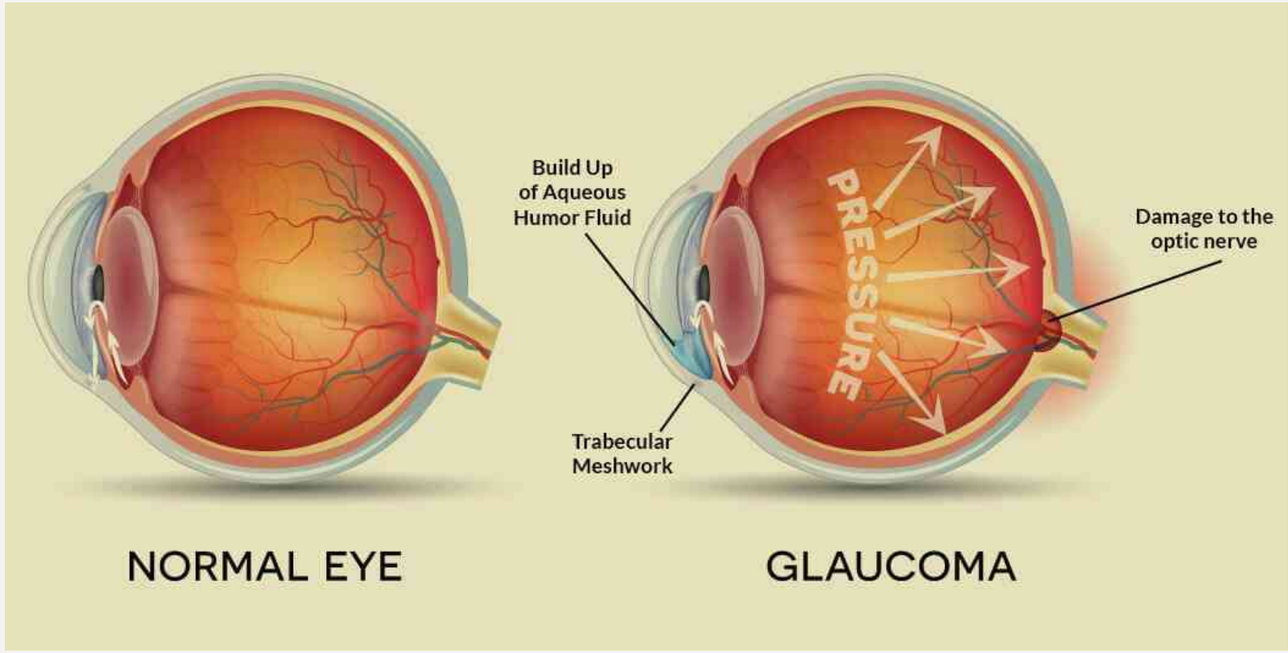
Causes

Damage to the optic nerve imposed by increase intra ocular pressure gradually leads to the development of blind spots in the visual field. Elevated eye pressure, in turn, is due to a build-up of a fluid (aqueous humor) that flows through the eye interior. This internal fluid normally drains out through a tissue called the trabecular meshwork at the angle where the iris and cornea meet. When fluid is overproduced or the drainage system doesn't work properly, the fluid can't flow out at its normal rate and eye pressure increases.

Glaucoma has a hereditary tendency, and can appear in old ages. In some people, scientists have identified genes related to high eye pressure and optic nerve damage.

1. Open Angle Glaucoma

Open-angle glaucoma (OAG) is a chronic, progressive, and irreversible multifactorial optic neuropathy that is characterized by open angle of the anterior chamber, typical optic nerve head changes, progressive loss of peripheral vision (typical visual



field changes) followed by central visual field loss (blindness) for which intraocular pressure (IOP) is an important risk factor. The disease is usually bilateral, but asymmetry is often seen depending on the etiology. It is important to note that increased intraocular pressure is not a necessary prerequisite for glaucomatous optic nerve damage, nor are the two necessarily correlated as studies have shown individuals witch chronically elevated intraocular pressures being asymptomatic. The angle is where the clear part of your eye, the cornea, meets the colored part of your eye, the iris. It's important because that's where the system to drain your eye fluid sits. It's like a strainer with a web of tiny holes that lead to drainpipes below. In some other types of glaucoma, the angle is too narrow or closed, so fluid can't even reach the drainage system. But in this case, the angle isn't the problem. It's wide open, which is normal. Instead, you have a clog or some other problem deeper in the system. Your eye can also be producing too much fluid that causes a backup in outflow. Both cause fluids to drain more slowly, which raises the pressure in your eye.

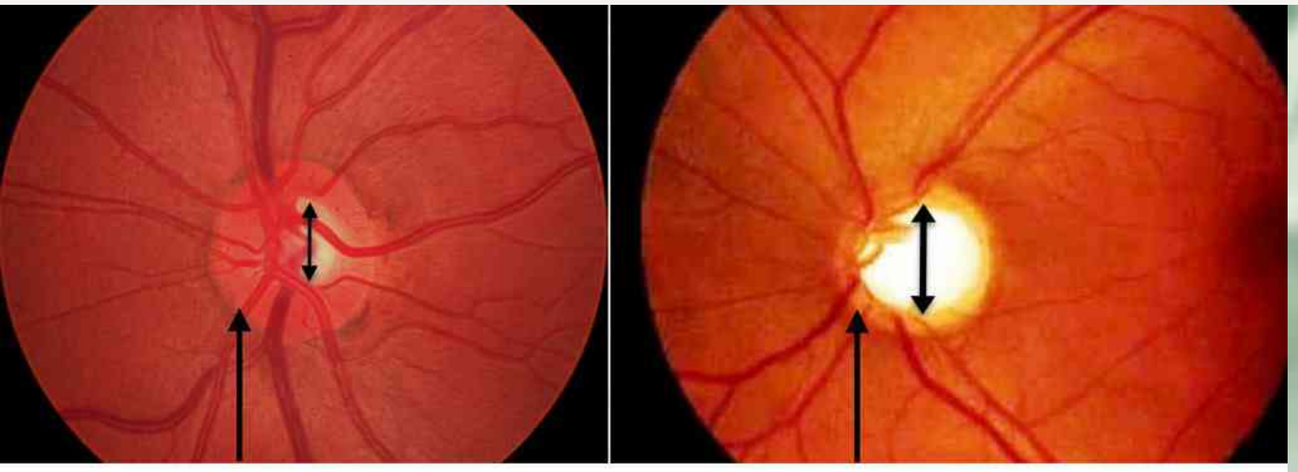
2. Angle Closure Glaucoma

Angle-closure glaucoma, a less common form of glaucoma characterised by increased pressure in the front chamber (anterior chamber) of the eye due to sudden (acute) or slowly progressive (chronic) blockage of the normal circulation of fluid within the eye. The block takes place at the angle of the anterior chamber formed by its junction of the cornea with the iris. Angle-closure glaucoma tends to affect people born with a narrow angle. Certain races, such as people of Asian and Eskimo ancestry, are at higher risk of developing it. Age and family history are risk factors. It occurs in older women more often than others. When the pupil of the eye is wide open (dilated), the iris is retracted and thickened, and it can block the area around the canal of Schlemm, a drainage pathway for fluid within the eye. Blocking the drainage canal of Schlemm elevates pressure. With acute angle closure glaucoma, there is an abrupt increase in intra ocular pressure (IOP) due to the build up of aqueous (fluid) in the eye. The high pressure can damage the optic nerve (the nerve to the eye) and lead to blindness. The elevated pressure is best detected before the appearance of symptoms.

When symptoms of acute angle glaucoma do develop, they may include severe eye and facial pain, nausea and vomiting, decreased vision, blurred vision and seeing haloes around light. The eye in a far advanced case of angle closure glaucoma appears red with a steamy (clouded) cornea and a fixed (nonreactive) dilated pupil. Acute angle-closure glaucoma is an emergency because optic nerve damage and vision loss can occur within hours of the onset of the problem. Administering medications to lower the pressure within the eye is done first. In the past, a piece of the iris was then surgically removed in a procedure called an iridectomy to make a hole in the iris and create a channel (other than the canal of Schlemm) to permit the free flow of fluid. Today, a comparable procedure can be done by laser to create a small hole in the iris to keep the intraocular pressure within normal limits. This condition can be chronic (progressing slowly or occurring persistently) or acute (occurring suddenly). Chronic angle-closure glaucoma, like the more common type of glaucoma (open-angle glaucoma), may cause vision damage without symptoms.

Open vs. angle closure glaucoma

The angle in the glaucoma type refers to the angle that the iris makes with the cornea. In open-angle glaucoma, the iris is in the right position, and the uveo-scleral drainage canals are clear. But the trabecular meshwork isn't draining properly. The trabecular meshwork offers



Normal optic nerve head

Glaucomatous cupping

increased resistance to fluid outflow. This causes the pressure to build up inside your eye.

In closed-angle glaucoma, the iris is squeezed against the cornea; and both the uveoscleral drain and the trabecular meshwork become blocked.

3. Normal Tension Glaucoma

Normal tension glaucoma (NTG) is a common form of primary open angle glaucoma (POAG) in which there is no measured elevation of the intraocular pressure (IOP). The clinical characteristics of NTG have many similarities to those in POAG, with a few notable distinctions. Like POAG, NTG is a chronic, progressive optic neuropathy that results in a characteristic optic nerve head cupping, retinal nerve fibre layer thinning and functional visual field loss. Careful and complete review of history, physical exam findings, and diagnostic testing are key to distinguishing NTG from other common forms of glaucomatous and non-glaucomatous optic neuropathy. The role of IOP in the pathogenesis of NTG is an area of controversy prompting research into a variety of IOP independent factors such as vascular dysregulation, hypotension, and lamina cribrosa abnormalities that may have some role to play in the development of this disease. Therefore, other proposed interventions in NTG have aimed at modification of blood pressure and optic nerve perfusion in addition to neuroprotection as a means of slowing disease progression independent of an IOP lowering mechanism. Despite the lack of an observed IOP elevation, the current medical and surgical treatment of NTG continues to be aimed at lowering IOP as in other forms of POAG.

4. Pigmentary glaucoma.

With this form, tiny bits of pigment from the iris, get into the fluid inside the eye and clog the drainage canals.

Risk Factors for Glaucoma

a. Strong risk factors for open-angle glaucoma include:

High eye pressure
Family history of glaucoma
Age 40 and older for African Americans
Age 60 and older for the general population, especially Mexican Americans
Thin cornea
Suspicious optic nerve appearance with increased cupping (size of cup, the space at the centre of optic nerve, is larger than normal)

Potential risk factors for open-angle glaucoma include:

High myopia (very severe nearsightedness)
Diabetes
Eye surgery or injury
High blood pressure
Use of corticosteroids (for example, eye drops, pills, inhalers, and creams)

b. Risk Factors for Angle-Closure Glaucoma

Age 40 and older
Family history of glaucoma
Poor short-distance vision (farsightedness)
Eye injury or eye surgery
East Asian and Inuit ethnicity

c. Risk Factors for Normal-Tension Glaucoma

Cardiovascular disease
Family history of glaucoma
Low eye pressure
Japanese ethnicity

Prevention

These self-care steps can help early detection of glaucoma.

Regular dilated eye examinations: As a general rule, the American Academy of Ophthalmology recommends having a comprehensive eye exam every five to 10 years if under 40 years of age; every two to four years if 40 to 54 years old; every one to three years if 55 to 64 years old; and every one to two years if older than 65.
Awareness about family's eye health history: Glaucoma tends to run in families, hence, a person at increased risk will need more frequent screening.
Exercise: Regular, moderate exercise may help prevent glaucoma by reducing eye pressure, under the consultation of ophthalmologist.
Regular use of eye-drops on prescription: Glaucoma eye-drops can significantly reduce the risk that high eye pressure will progress to glaucoma.
#Use of eye protection. Serious eye injuries can lead to glaucoma. Wear eye protection when using power tools or playing high-speed racket sports in enclosed courts.

GUEST OF PULLUT

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Pelicans are a genus of large water birds that belong to the family Pelecanidae. They are characterised by the presence of a long beak and a large throat pouch used for catching prey and draining water from the scooped-up contents before swallowing. They have predominantly pale plumage, the exceptions being the brown and Peruvian pelicans. Pelicans are found on many of the world's coastlines and also along lakes and rivers. They are social birds and typically travel in flocks, often strung out in a line. They also breed in groups called colonies, which typically gather on islands.

Pelicans live throughout the world in tropic and temperate zones, and always near bodies of water. Brown pelicans are exclusively marine birds. All pelicans like to be around other pelicans, and they don't mind being around other bird species, either, be they cormorants or flamingos. They nest in colonies in trees, bushes, or on the ground, depending on the species. When not eating, pelicans spend hours preening, snoozing, or sunbathing. At dusk, pelicans all settle down for the night. Their head rests back on their shoulders, their eyes close and their feathers ruffled against the cold.

Along with the giant pouch, pelicans are a large bird with short legs, and they appear rather clumsy on land. Once in the water, they are strong swimmers, thanks to their webbed feet. Pelicans and their relatives—cormorants, gannets, and boobies—are the only birds with totipalmate feet. This means that webbing connects all four of their toes, even the back toe. Pelicans also get a little help staying afloat: air pockets in their skeleton and beneath their wings provide added buoyancy. Besides, the birds use their bill to coat their feathers with a kind of water-proofing oil produced from by the preen gland at the

base of the tail. This keeps their feathers from becoming waterlogged and weighing them down.

Pelicans are splendid fliers, too, and can soar like eagles with their giant wings. Getting up in the air can be challenging without the help of the wind. Pelicans must run over the water while beating their big wings and pounding the surface of the water with both feet in unison to get enough speed for takeoff. Many pelicans fish by swimming in cooperative groups. They may form a line or a "U" shape and drive fish into shallow water by beating their wings on the surface. When fish congregate in the shallows, the pelicans simply scoop them up. The brown pelican, on the other hand, dives on fish (usually a type of herring called menhaden) from above and snares them in its bill. Pelicans do not store fish in their pouch, but simply use it to catch them and then tip it back to drain out water and swallow the fish immediately. The American white pelican can hold some 3 gallons of water in its bill. Young pelicans feed by sticking their bills into their parents' throats to retrieve food.

Breeding colonies often consist of hundreds of these birds all crowded onto one small island. Breeding season varies with the species. Brown pelicans in warmer climes may nest throughout the year. American white pelicans in colder areas nest in May and June. At the start of the breeding season, a pelican's bare face and pouch flush yellow, pink, or orange, depending on species and gender, and an occipital (back of the head) crest forms. American white pelicans develop a knob on the top of the bill that is shed after the breeding season. The female's facial skin turns pastel orange, and males get a pale yellow coloring on their face. Pelicans lay one to four bluish white eggs in a stick nest and the young ones hatch in about a month. The nestlings live on regurgitated food obtained by thrusting their bills down the parent's gullet. The young mature at three to four years. Though ungainly on land, pelicans are impressive in flight. They usually travel in small flocks, soaring overhead and often beating their wings in unison. The sexes are similar in appearance, but males are larger. Pelicans usually breed in colonies on islands; there may be many small colonies on a single island. The gregarious North American white pelican breeds on islands in lakes in north-central and western North America; all pairs in any colony at any given time are in the same stage of the reproductive cycle. It is migratory, as are some other species. The brown pelican breeds along the tropical and subtropical shores of both the Atlantic and Pacific coasts.

Chicks hatch with eyes shut and have a stubby bill and bare, pink skin. Within a few days, their eyes open, they start to grow their first down feathers, and their bill lengthens. The young are not fed from the pouch; instead, the parents open their mouth wide to allow the young to reach down into the gullet to get regurgitated food. The poor parents must feed their chicks up to 30 times. The chick gets its wing and tail feathers after three to four weeks. At this point, the young of ground-nesting pelicans cluster together in pods while both parents hunt. When they return, the parents are able to find their own chicks in the pod and feed them. Chicks fledge in 70 to 85 days and join their parents for fishing and roosting.

Calendar

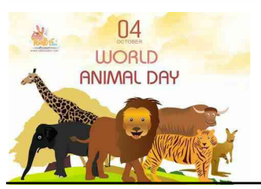
October 2020

World Farm Animals Day

October 2

World Habitat Day

First Monday of October



World Animal Day

October 4

Energy Efficiency Day

First Wednesday in October

International Day for Natural Disaster Reduction

October 13

International E-Waste Day

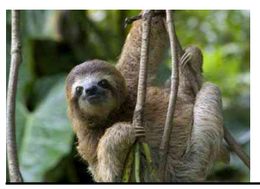
October 14

Sustainability Day

Fourth Wednesday of October

World Okapi Day

October 18



International Sloth Day

October 20

National Reptile Awareness Day

October 21

International Wombat Day

October 22

International Snow Leopard Day

October 23

International Freshwater Dolphin Day

October 24

World Lemur Day

Last Friday of October

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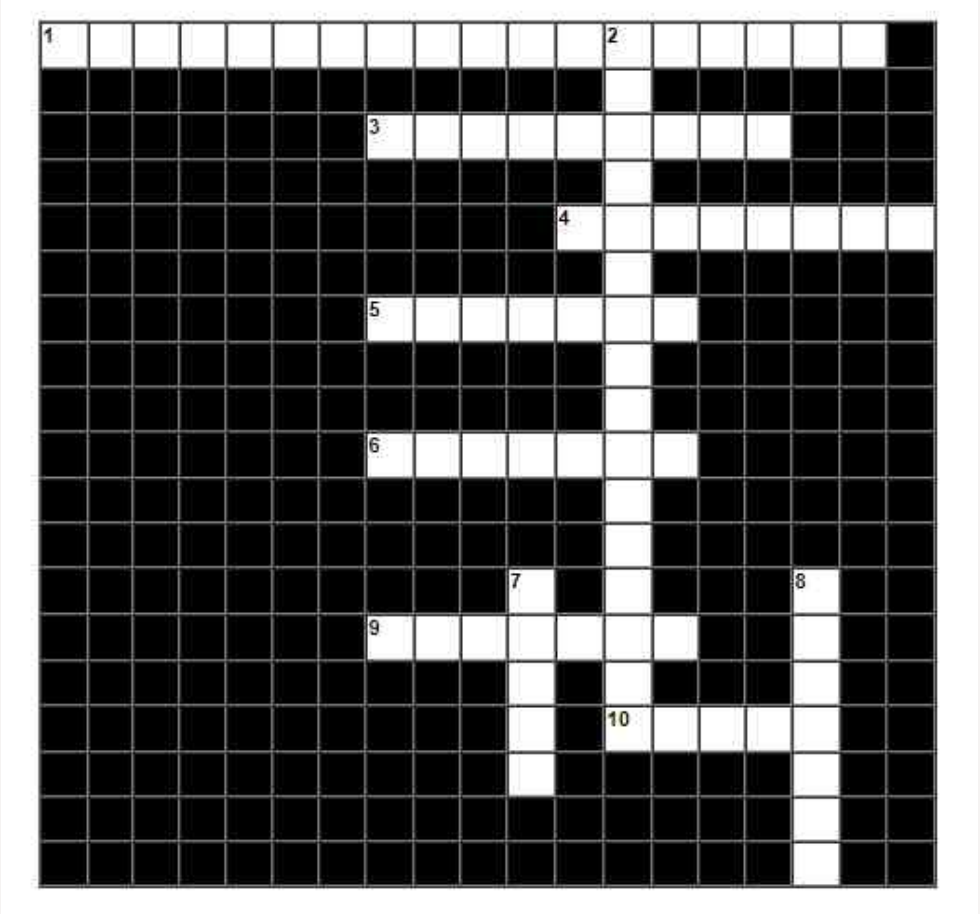

Across

1.Scientific name of 'mud puppy'.
3.The only snake in the world that builds a nest.
4.Second largest phylum in animal world.
5.Heavy metal which causes black foot disease.
6.Animal commonly called as sea hare.
9.Which body part is mainly affected by 'Hashimoto disease'?
10.The only bone in our body that isn't directly attached to any other bone.

Down

2.Only adult vertebrate without haemoglobin.
7.Causative agent of 'Kuru Disease'.
8.Animal protected in Rann of Kutch Santuary.