NORTH EASTERN DIABETES SOCIETY
SCIENTIFIC UPDATE

Volume-1 | News Letter | January, 2015

Editor's Desk

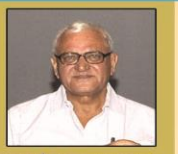
Since the days of NEDS inception way back in 1995 a lot of water has flown down the mighty Brahmaputra, and NEDS with the active support of the Doctors fraternity is adding new chapter in its journey of quest for excellence. With the launching of the first edition of "North Eastern Diabetes Society Scientific Update", NEDS will be adding another feather to its cap. This update will be catering to the need of the General Practitioners, Diabetologists and Specialist Doctors population and also special focus will be on the trend of this disease in the north east. The first section of every issue will be devoted to the basics of Diabetes so as to keep our basics right and as a special emphasis to the doctors serving in the periphery. Special section will be dedicated on the recent advancement in the field of diabetology and on the preventive aspect of the disease. I hope this initiative of us will go a long way in disseminating the knowledge of Diabetes among the Doctors population of North East and will contribute a lot in combating this menace. To strengthen this initiative I would request our fellow Doctors to send good scholarly articles for the coming updates. The same can be emailed to sanjibmedhi2@gmail.com.

North Eastern Diabetes Society also successfully organized world Diabetes Day on 14 Nov 2014 with great fanfare. The day started with a grand rally of around 1000 participants including school childrens followed by Half Marathon with handsome prize money. This was followed by a day long programme at District Library which included Drama on Diabetes, Inter school quiz competition and awareness meet. The medical camp was attended by around 1500 patients, who underwent ECG, Lipid Profile, Blood sugar, Hepatic and Renal function test ect. The Chief Guest was Commissioner of sports, Govt of Assam Mr Ajay Tewari and Guest of Honor was noted writer Mr Hare Krishna Deka. The highlight of the day was the huge conglomeration of Ty 1 Diabetes Childrens who in the presence of noted Assamese actress Mrs Nishita Goswami released balloons at Dighali Pukhari. This drew the attention of the society towards the plight of these childrens.

In the coming years NEDS will take a more proactive role to combat this epidemic for which we require the support of the Doctor fraternity, Pharma industry and the population at large, so that we can achieve even greater height.

Dr. Sanjib Medhi

President's Message



The North Eastern Diabetes Society is proud to present this inaugural issue of its Quarterly Diabetes Scientific Update.

Medical knowledge continues to increase at an outstanding pace which creates challenges for physicians to keep abreast of biomedicial discoveries and novel therapeutics that can positively impact patient outcomes. It is also a fact that physicians are either too busy to go through the changes in medical literature or do not have easy access to it.

It is hoped that by including some interesting and relevant topics in the Scientific Update ,we are able to bring a change albeit small, in the way clinicians perceive diabetes. We hope you like this compilation and its provides informative and interesting reading .

Dr. Mihir Saikia

Editor in-chief

THE HISTORY OF NORTH EASTERN DIABETES SOCIETY :

The North Eastern Diabetes Society is the long awaited need of N.E region. The visionaries of the society are Dr. Prem Ch. Singh and Dr. Biren Th. Singh from Manipur, Dr. P.K. Bhattacharjee from Agartala, Dr. (Mrs.) S. Dutta Choudhury and Dr. Mihir Saikia, Lt. Dr. Shekhar Shah from Guwahati and Dr. Amio Sarma from Jorhat. At this juncture it is worth to mention the national dignitaries who had constant inspiration for the formation of the society. To mention the names of the legends in the field of Diabetology are Lt. Prof. M.M. Ahuja (AIIMS), Lt. Prof. Viswanathan of Chennai, Lt. Prof. B.B. Tripathi of Orissa, Lt. Prof. S.G.P. Moses of Chennai. Lt. Prof. B.B. Tripathi came to Jorhat for the formal inauguration of the NEDS in 1995. The entire NEDS family remembers them with respect and honour. From that time the physicians and the Diabetologists of this region are working together and taken responsibility of moving forward the organization in NE Region. First annual conference was held at Jorhat in 1996. The N.E states of this region had annual conferences every year in different times. The meeting for public awareness, diabetes detection camps in both urban and rural areas, CME to educate primary care physician are organized periodically by NEDS. Celebration of World Diabetes Day are some of the important service rendered by NEDS for the benefit of the people in this region. Many national and international faculties has participated in NEDS conferences. The academic wings of NEDS are organizing many workshops, seminars, with an idea of giving the latest scientific message to physician and public. Update books are published periodically for ready reconer of the physician.

It is over whelming to note that NEDS is coming out with Scientific update at periodic interval for primary and secondary care physician of this region. This will benefit the physicians, diabetologist to update and exchange their views on the current problems. LONG LIVE NEDS

With all best wishes...

Dr. Amio Sarma
Founder President of NEDS

INSULIN

Dr. Anindita Mahanta
Department of Physiology
Gauhati Medical College, Guwahati

Insulin gets its name from the Latin "Insula" meaning island, because it is secreted by groups of pancreatic cells known as the Islets of Langerhans. The islets are ovoid, 76*175µm collections of cells, numbering 1-2 million, scattered throughout the pancreas and make up about 2% of the volume of the gland. At least, four different distinct cell types have been identified in the islets in humans: A,B,D and F, of which, the B cells are most common (60-75% of islet cell population), generally located in the centre of each islet and secrete Insulin. In the B cells, insulin is present in secretory granules where it forms polymers incorporating zinc but the biologically active form of insulin is the monomer.

The fact that diabetes is linked to the pancreas was confirmed in 1889 when two German researchers, Joseph von Mering and Oskar Minkowski, removed the pancreas from dogs, who then developed a syndrome closely resembling type I diabetes (hyperglycaemia, excess urination, thirst, weight loss, finally leading to death). Scientists concluded that the pancreas produces a chemical messenger that controls the blood sugar levels. In 1920, Frederick Banting put forth the idea that since the pancreas secreted a protein-destroying enzyme, it might be destroying the very protein that the scientists had been searching for. He believed that if the enzyme secreting ducts were removed or ligated, the remainder of the pancreas might yield the elusive chemical messenger. After some persuasion, John MacLeod, Professor of Physiology at the University of Toronto, accepted Banting into his department. Assisted by research student, Charles Best, Banting proved his theory correct. Then, in July, 1921, they managed to isolate a pure extract of the vital protein, which they called "Insulin". Initiaaly, they demonstrated that an aqueous extract of pancreas could lower blood glucose and prolong survival in a pancreatectomised dog. Within months, a more purified extract was shown to lower blood glucose in a young man with diabetes, 14-year old Leonard Thompson, who was treated at the Toronto General Hospital in January, 1922 by doctors Walter A Campbell and Alma A Fletcher and went to lead a relatively normal life with daily doses of insulin. By the end of 1923, insulin was being prepared from pork and beef pancreas on an industrial scale and patients from around the world were receiving effective treatment for diabetes. The discovery and production of insulin was such an important medical breakthrough that Banting and MacLeod were jointly awarded the Nobel Prize for Physiology or Medicine in 1923. Banting was outraged that Best had not been recognized by the Nobel Prize committee and gave half of his prize money to Best, while McLeod gave half of his to Collip. In 1926, Abel prepared crystalline insulin. The detailed amino acid structure of insulin was described by Sanger in 1952. Steiner discovered proinsuin in 1967 and the three-dimensional structure of insulin was revealed by Dorothy Hodgkin in 1969.

Insulin is a polypeptide, with a molecular weight of 5808, containing 2 amino acid chains: A chain with 21 amino acids and B chain with 30 amino acids. The two chains are linked by disulphide bridges. Minor differences occur in the amino acid composition of the insulin molecule from species to species. E.g. pork insulin differs from human insulin by a single amino acid (the 30th amino acid in the B chain is Threonine in human insulin and Alanine in pork insulin). Beef insulin differs from human insulin by 3 amino acids (In human insulin, the A chain has Threonine and Isoleucine at the 8th and 10th positions respectively and Threonine at the 30th position of B chain; the corresponding amino acids in beef insulin are Alanine, Valine and Alanine respectively). The differences are generally not sufficient to affect the biologic activity of a particular insulin in heterologous species but are sufficient to make the insulin antigenic. If insulin of one species is injected for a prolonged period into another species, the anti-insulin antibodies formed inhibit the injected insulin. Almost all humans who have received commercial beef insulin for more than 2 months have antibodies against beef insulin but the titer is low. Human insulin produced in bacteria by recombinant DNA technology is now widely used to avoid antibody formation.

The gene for insulin is located on the short arm of chromosome 11 in humans. Insulin is synthesized as part of a larger preprohormone, Preproinsulin. Removal of a 23-amino acid signal peptide followed by folding of the molecule and formation of disulphide bonds results in the formation of Proinsulin. The peptide segment connecting the A and B chains, the Connecting peptide (C peptide), facilitates the folding and is cleaved from the insulin molecule before secretion. Normally, 90-97% of the product released from the B cells is insulin along with equimolar amounts of C peptide. The rest is mostly proinsulin, which is 1/20th as potent as insulin on a molar basis.

C peptide has no established biologic action. However, because it is secreted in a 1:1 molar ratio with insulin, measurement of the C peptide level by radioimmunoassay is an useful marker for insulin secretion, especially as an index of B cell function in patients receiving exogenous insulin. Most (60-80%) of the secreted insulin is degraded in the liver and kidneys by the enzyme Insulin protease (Insulinase). The half-life of circulating insulin is 5-6 minutes. This rapid removal from plasma is important because at times it is equally important to rapidly turn off as it is to turn on the control functions of insulin. In sharp contrast to insulin, C peptide is not extracted by the liver at all. As a result, whereas, measurements of insulin in systemic blood do not quantitatively mimic the secretion of insulin, measurements of C peptide do. C peptide is eventually excreted in urine and measurement of urinary C peptide can be used clinically to assess a person's insulin secretory capability.

The normal concentration of insulin in the peripheral venous plasma of fasting normal humans is 0-70µU/ml. The amount of insulin secreted in the basal state is about 1U/hr, with a five to tenfold increase following ingestion of food. The average amount of insulin secreted per day is about 40U in a normal human. Glucose acts directly on the pancreatic B cells to increase insulin secretion. The response to intravenous glucose is biphasic: there is a rapid but short-lived increase in secretion which lasts 2-5 minutes followed by a more slowly developing prolonged increase, which persists as long as the blood blood glucose level remains elevated. On the basis of experiments performed on the isolated perfused rat pancreas, Grodsky (1972) proposed a two-compartment model to explain the biphasic insulin response, which was further elucidated by Lacy and Malaisse in 1973. At present, it is known that the insulin released during the first-phase arises from preformed insulin that has been packaged in the secretory granules in the cytosol of B cells. The late-phase insulin response also comes from preformed insulin with some contribution from newly synthesized insulin. One of the earliest detectable metabolic defects that occurs in diabetes is loss of the first phase of insulin secretion, which can be detected experimentally by an intravenous glucose tolerance test. Oral glucose causes the plasma glucose concentration to rise slowly so that the acute-phase insulin response can no longer be distinguished from the delayed, secondary response and only a single phase of insulin secretion is apparent. However, the total insulin response to an oral glucose challenge exceeds the response observed when comparable changes in plasma glucose concentration are produced by IV glucose. This difference is referred to as the "Incretin effect" and is mediated by various gastrointestinal hormones, notably Gastric Inhibitory Peptide (GIP).

The physiologic effects of insulin are far-reaching and complex. They can be divided into rapid, intermediate and delayed actions. The rapid actions occur within seconds and include the increased transport of glucose, amino acids, K+ and PO43- into insulin-sensitive cells. Within seconds after insulin binds with its membrane receptors, about 80% of the body's cells markedly increase their uptake of glucose. This effect is believed to result from the translocation of multiple intracellular vesicles to the cell membrane; these vesicles carry glucose transport proteins (GLUTs) which bind to the cell membrane and facilitate glucose uptake. When insulin is no longer available, the vesicles separate from the cell membrane within 3-5 minutes and move back to the cell interior, to be used again as and when needed. Seven different glucose transporters (GLUTs), called GLUT 1-7 in order of discovery, have been characterized. GLUT 4 is the transporter in muscle and adipose tissue that is stimulated by insulin. Insulin-sensitive cells also contain a population of GLUT 4 vesicles that move to the cell membrane in response to exercise and are independent of the action of insulin. This is why exercise lowers the blood glucose. A 5' AMP activated kinase may be responsible for this effect.

The brain is quite different from most other tissues of the body in that insulin has little or no effect on the uptake or use of glucose. Brain calls are even normally permeable to glucose and can use glucose without the intermediation of insulin, Moreover, brain normally use only glucose for energy and can use other energy substrates only with difficulty. It is therefore essential that the blood glucose level be maintained above a critical level, which is one of the most important functions of the blood glucose control system. One important compensation for hypoglycaemia is the cessation of secretion of endogenous insulin, which is complete at a plasma glucose level of about 80mg/dl.

The intermediate actions of insulin occur in te next 10-15 minutes to change the activity levels of intracellular metabolic enzymes due to the changed states of phosphorylation of the enzymes. This results in increased protein synthesis, decreased protein degradation, activation of glycolytic enzymes and glycogen synthetase and inhibition of phosphorylase and gluconeogenic enzymes. The delayed effects continue to occur for hours or even several days and result from the changed rates of translation of mRNAs 9increase in mRNAs of lipogenic and other enzymes). Still slower effects result from the changed rates of DNA transcription. Thus, insulin causes remodeling of the cellular enzymatic machinery to achieve its metabolic goals.

The net effect of insulin is storage of carbohydrate, fat and protein. Therefore, it is appropriately called "Hormone of abundance". The anabolic effect of insulin is aided by the protein-sparing action of adequate intracellular glucose supplies. Failure to grow is a symptom of diabetes in children and insulin stimulates the growth of immature hypophysectomised rats to almost the same degree as Growth hormone. Maximum insulin-induced growth is present, however, only when the protein-sparing effect of glucose is fostered by feeding a high carbohydrate diet.

The ability of insulin to act on a target cell depends three things: the number of receptors present on the target cells, the receptor's affinity for insulin and the receptor's ability to transducer the insulin signal. The insulin receptor is a tetramer made up of 2 α and 2 β glycoprotein subunits, having a molecular weight of 3,40,000 and encoded by a gene on chromosome 19. The α subunits bind insulin and are extracellular whereas the β subunits span the membrane and have Tyrosine kinase activity in their intracellular portions. Binding of insulin to its receptor triggers the tyrosine kinase activity of the β subunits, producing

Student Life Joke

I am the most outstanding studen of my class.....
Because, I always stand outside the class.
Proud to be Out-Standing Student.

Brain is most outstanding object in world, if function 24hours a days, 365days a year, right from time we are born, stops when we enter Examination Hall.

Lion bounced on wife

In an African Safari, A LION suddenly bounced on Sukhvinder's wife.

Wife : Shoot him! Shoot him!

Sukhvinder: Yes, Yes. I'm changing the battery of my camera.

autophosphorylation of the β subunits on the tyrosine residues (which is essential for insulin to exert its biologic effects) and leads to phosphorylation of some cytoplasmic proteins and dephosphorylation of others, mostly on serine and threonine residues. The targets of tyrosine phosphorylation include a family of cytosolic proteins known as Insulin-Receptor Substrates (IRS-1, IRS-2, IRS-3 and IRS-4) as well as Src Homology C terminus (SHC). The three major signaling pathways trigerred by the aforementioned tyrosine phosphorylationn are:

1. Binding of phosphatidylinositol-3-kinase (PI3K) to phosphorylated IRS causes activation of PI3K and phosphorylates a membrane lipid Pphosphatidylinositol-4,5-bisphosphate (PIP2) to PIP3, leading to changes in glucose and protein metabolism.

2. Either the phosphorylation of SHC or the binding of GRB2 to IRS causing activation of GRB2 triggers the Ras signaling pathway, leading through MEK and MAP kinases to increased gene expression and growth.

3. Binding of SH2-containing proteins to specific phosphotyrosine groups on either the insulin receptor or IRS proteins activates the SH2-containing protein.

Several disorders have been described in which a mutation of the insulin receptor blunts or prevents insulin's actions. One such mutation, which results in a rare disorder called Leprechaunism, markedly affects growth in-utero as well as after birth and is generally lethal within the first year of life. Some individuals make antibodies to their own insulin receptors, blunting the body's response to both endogenous as well as exogenous insulin and producing hyperglycaemia. Neither receptor mutations nor antireceptor antibodies appear to be responsible for any of the common forms of diabetes seen clinically. However, abnormal function of the insulin receptor may be involved.

Cloning of the insulin gene has led to an important therapeutic advance, namely the use of recombinant human insulin for treatment of diabetes. Sequencing of the insulin gene has also brought to light the fact that rare patients with diabetes make a mutant insulin molecule, leading to a less active insulin molecule, typically only about 1% as potent as insulin on a molar basis. These patients have either glucose intolerance or frank diabetes, but very high concentrations of immunoreactive insulin in their plasma.

Following the discovery of insulin in 1921, the physiology of its synthesis, secretion and action has been studied extensively. At present, much is known about the metabolic pathways through which insulin regulates carbohydrate, lipid and protein metabolism. However, the sequence of intracellular signals that triggers insulin secretion by pancreatic B cells, the signal transduction process triggered when insulin binds to its receptor and the process by which the immune system recognizes and targets B cells for destruction remain areas of intense study.

REFERENCES

1. Review of Medical Physiology. Walter F Ganong.

2. Medical Physiology. Walter F Boron, Emile L Boulpaep.

3. Textbook of Medical Physiology. Guyton & Hall.

4. Samson Wright's Applied Physiology. Cyril A Keele, Eric Neil and Norman Joels

5. The Book of Inventions. Ian Harrison.

❑❑❑

DIABETES MELLITUS CONCEPTUAL NUTSHELL

Dr. A. B. Choudhury
Senior Physician & Diabetologist,
Dimapur, Nagaland

"Infections come and go away,
Lifestyle disorders are here to stay "

Diabetes Mellitus is an all-pervading disorder affecting almost all the vital organs of the body. The enormity of the challenge posed by diabetes mellitus to the medical practitioners is not only in terms of numbers but also in terms of diversity in its presentation. One would shudder at the thought that a third of the Indian population would be diabetic by the next decade or so. It requires a multi-dimensional approach to treatment. It goes without saying that management of diabetes mellitus is no longer the preserve of endocrinologists alone, but should prevail down to the primary care physicians and even paramedics. The need of the hour is to sensitise healthcare professionals at all levels about the basic issues in the management of diabetes mellitus. Early intervention is the key to effective management. This article is an attempt to address some of these key basic issues in simple practical terms.

WHAT IS DIABETES MELLITUS?

Diabetes Mellitus is a complex metabolic disorder characterised by persistent or transient rise in blood sugar level due to deficient insulin secretion and/or inefficient insulin action leading to inadequate uptake and utilisation of glucose in the tissues. This definition, however, is limiting and does not explain the plethora of patho-physiological changes associated with diabetes.

WHAT ARE THE TYPES OF DIABETES MELLITUS?

Diabetes Mellitus is classified into four broad categories,based on etiology. They are -

1. Type I Diabetes, earlier known as insulin-dependent diabetes, comprises 5-10% of diabetic population, with highest incidence in Scandinavian countries, viz. Norway, Finland and Sweden. It is an auto-immune disorder with partial or total destruction of beta islet cells of pancreas. It is most common in children but may also manifest in adults. It is worthwhile to remember that children with Type I diabetes quite often present with diabetic keto-acidosis and medical professionals need to keep an eye while treating patients with symptoms like exhaustion, dehydration, etc. In adults, Type I diabetes is referred to as Latent Auto-immune Diabetes in Adults or in short, LADA. Diabetic keto-acidosis is less common in adults.

2. Type II Diabetes, earlier called maturity onset diabetes is the commonest type of diabetes and accounts for a vast majority of diabetic patients. The core defect in the genesis of Type II diabetes is insulin resistence. However, with passage of time, beta cell dysfunction sets in. In practice, therefore, Type II diabetes is a combination of beta cell dysfunction and insulin resistence. But what is most disconcerting is the fact that this type of diabetes is associated with other metabolic disorders and patient care can not be limited to control of blood sugar alone. Management of conditions like dyslipidaemia, obesity, hypertension, gout, nephropathy, neuropathy, sexual dysfunction,etc. form an integral part of treatment. It is now understood that this type of diabetes can develop quite early in life and therefore the term maturity onset diabetes is a misnomer.

3. Other specific types of diabetes account for less than 3% of the diabetic population and are classified under eight sub-groups. Common conditions with associated features of diabetes include -

a) Maturity onset diabetes in young or in short, MODY due to genetic defects in beta cell function.
b) Pancreatitis.
c) Post-pancreatectomy
d) Pancreatic Neoplasm
e) Cystic Fibrosis
f) Hyperthyroidism
g) Phaeochromocytoma
i) Use of drugs like thiazide diuretics, glucocorticoids, beta blockers, thyroid hormones, dilantin,etc.
j) Chronic Rubella
k) Genetic disorders like Down's Syndrome, Klinefelter's Syndrome, Turner's Syndrome, etc.

Correct identification of these patients is important because their treatment and prognosis may differ.

4. Gestational diabetes is defined as glucose intolerance with the onset during pregnancy. Blood glucose levels tend to revert back to normal soon after childbirth but may persist in some individuals. They eventually develop Type II diabetes.

Besides these established classes of diabetes, a class of Pre-diabetics is now recognised.This class of individuals is inclined to develope into full-blown diabetes over a period of time. Early lifestyle intervention prevents or delays the onset of diabetes in such individuals. Pre-diabetics can be grouped as -

a) Impaired fasting glucose (IFG), where fasting blood glucose is between 100-125 mg/dl.
b) Impaired glucose tolerence (IGT), where 2-hr. plasma glucose after a glucose load equivalent to 75mg of anhydrous glucose is between 140-199 mg/dl.
c) HbA1c level between 5.7- 6.4%.

While talking of lifestyle intervention, it is worthwhile to identify individuals who are prone to develop diabetes in later life - the Potential diabetics. They are individuals with -

a) family history of diabetes.
b) High BMI, but more particularly central obesity.
c) Polycystic ovarian syndrome.
d) Physical inactivity, combined with high calorie diet.
e) Dyslipidaemia, particularly high triglyceride and low HDL levels
f) Acanthosis nigrans
g) Hypertension
h) Sudden weight gain, especially in children.

HOW DO WE DIAGNOSE DIABETES MELLITUS?

The diagnoistic criteria for diabetes mellitus as laid down by American Diabetic Association and endorsed by other authorities are -

a) Glycosylated haemoglobin (HbA1c) above 6.5%
b) Fasting plasma glucose above 126 mg/dl.
c) 2-hr. plasma glucose above 200 mg/dl after a glucose load equivalent to 75 mg. of anhydrous glucose.
d) In an individual with classic symptoms of diabetes, random blood glucose above 200 mg/dl.

Gestational diabetes is diagnosed by estimation of plasma glucose 2hrs. 75mg. of anhydrous glucose orally irrespective of whether the patient had taken any food earlier. The diagnoistic criteria are sameas mentioned earlier. HLA genotyping and immunological tests help us to diagnose Type I diabetes. In addition to these screening for pre-diabetics may be carried out as mentioned earlier. Measurement of height, weight, abdominal girth at the level of the umbilicus are important to ascertain BMI and central obesity. Routine measurement of blood pressure is essential. Investigations for other associated conditions include estimation of serum lipid profile, uric acid, renal profile, thyroid profile,etc. Urine should be examined for ketone bodies in children and microalbumin in adults. Biothesiometry is helpful in identifying early neuropathy. Fundus examination should be done periodically.

We must appreciate that control of blood sugar is not the sole objective of treatment. Prevention of complications is equally important. Treatment needs to be tailor-made and not readymade and so, a thorough assesment is vital.

❑❑❑

Nice Doctor

Because of an ear infection, Little Johny, had to go to the pediatrician.
The doctor directed his comments and questions to Little Johny in a professional manner.
When he asked Little Johny. "Is there anything you are allergic to?"
Little Johny nodded and whispered in his ear.
Smiling , the pediatrician wrote out a prescription and handed it to Little Johny's mother. She tucked it into her purse without looking at it.
As the pharmacist filled the order, he remarked on the unusual food-drug interaction Little Johny may have.
Little Johny's mother looked puzzled until he showed her the label on the bottle.
As the doctor's instructions, it reads, "Do not take with broccoli.

WEATHER

Teacher : Why did Ramesh make a hole in his new umbrella?
Student : Because he wanted to be able to tell when it stopped raining
Teacher : You never get anything right, What kind of job do you think you'll get when you leave school?
Student : Well, I want to be the weather girl on TV.
Teacher : If six children and two dogs were under an umbrella, how come none of them got wet?
Student : Because it wasn't raining.
Teacher : How did you find the weather at camp?
Student : It was easy. I just went outside- and there it was!
Teacher : If a farmer raises wheat in dry weather. what does he raise in wet weather?
Student : An umbrella.

Pathological Investigations for Diagnosis & Management of Diabetes Mellitus

Dr. Kalyan Kumar Baruah, MD (Path.)

Various Pathological investigations are to be performed to detect and diagnose diabetes and pre-diabetes, to monitor and control glucose levels over time, and to detect and monitor complications. Here an endeavour is made only to briefly outline some of the important tests in this context.

TESTS FOR SCREENING:

- Fasting glucose (fasting blood glucose, FBG) - this test measures the level of glucose in the blood after an 8-12 hour fast.
- Haemoglobin A1c or Glycosylated haemoglobin - this test evaluates the average amount of glucose in the blood over the last 2 to 3 months and has been recommended more recently as another test to screen for diabetes.
- For pregnant women glucose challenge test can be done to screen for gestational diabetes at 24-28 weeks of pregnancy.
- Sometimes a random blood glucose level is used for screening when a fasting test is not possible, such as when a person is seriously ill.
- Sometimes random urine samples are tested for glucose, protein and ketones.

TESTS FOR DIAGNOSIS

According to the American Diabetes Association (ADA), a fasting blood glucose, an oral glucose tolerance test, or a Haemoglobin A1c test may be used to diagnose diabetes and pre-diabetes. Each test has advantages, disadvantages, and limitations.

- The FBG requires an 8-hour fast.
- The OGTT requires that the person have a fasting glucose test, followed by drinking a standard amount of glucose solution to "challenge" their system, followed by another glucose test 2 hours later.
- With the HbA1c, people do not have to fast for 8 hours or endure multiple blood samples being taken over several hours.
- If the initial result from one of the above tests is abnormal, the test should be repeated on another day to confirm a diagnosis of diabetes.
- Gestational diabetes may be diagnosed doing a glucose tolerance test using 100-gram glucose. If the levels at fasting, 1 hour, 2 hour, or 3 hour glucose are above a certain level, then a diagnosis of gestational diabetes is made.

TESTS FOR MONITORING :

- Glucose - diabetics must monitor their own blood glucose levels, often several times a day using a glucose meter, to determine how far above or below normal their glucose is and accordingly modify their medications as per direction of a physician.
- Haemoglobin A1c- HbA1c is a measure of the average amount of glucose present in the blood over the last 2 to 3 months and helps the doctor to determine how well a treatment plan is working to control the person's blood glucose levels over time.
- Urine and/or blood ketone tests may be ordered to monitor people who present at the emergency room with symptoms suggesting acute hyperglycemia and to monitor those who are being treated for ketoacidosis. A build-up of ketones can occur whenever there is a decrease in the amount or effectiveness of insulin in the body.

  Occasionally other tests may be ordered to evaluate glucose levels over time. These may include:
- Fructosamine - Similar to the Haemoglobin A1c testing, fructosamine testing calculates the fraction of total serum proteins that have undergone glycation. Since albumin is the most common protein in blood, fructosamine levels typically reflect albumin glycation. Because albumin has a half-life of approximately 20 days, the plasma fructosamine concentration reflects relatively recent (1-2 week) changes in blood glucose. In patients with diseases that reduce red blood cell lifespan, such as haemolytic anaemia or haemoglobinopathies such as sickle-cell disease, a haemoglobin-based A1c test can be misleadingly low. A1c results may also be falsely high or low in haemoglobinopathies because abnormal haemoglobin variants can interfere in the analysis. In these cases, fructosamine measurement can be used as a marker of blood sugar levels, as its measurements are based on albumin instead of haemoglobin. However, any condition that changes serum albumin (such as the nephrotic syndrome) will affect the fructosamine result.
- Anhydroglucitol - It is a new test that detects high glucose levels in the past 1-2 weeks. 1,5-Anhydroglucitol, also known as 1,5-AG, can be used to identify glycemic variability in people with diabetes who have normal or near normal hemoglobin A1c levels. 1,5-Anhydroglucitol is a naturally occurring monosaccharide found in nearly all foods, 1,5-Anhydroglucitol values decrease during times of hyperglycemia above 180 mg/dl, and return to normal levels after approximately 2 weeks in the absence of hyperglycemia.

  Evaluate organ function, and detect emerging complications. Several laboratory tests may be used for this purpose.
- To monitor kidney function: Urine for routine examination, culture and for Microalbumin , Creatinine Clearance, eGFR, , Serum Urea and Serum Creatinine.
- Urine Albumin to Creatinine ratio(UACR): A spot urine sample can be used. Albuminuria is present when UACR is greater than 30mg/g and is a marker for chronic kidney disease.
- To monitor Serum lipids: Total cholesterol, HDL cholesterol, LDL cholesterol and Triglycerides.
- To monitor insulin production: Insulin, C-Peptide.
- Thyroid function test: Diabetic patients have a higher prevalence of thyroid disorders compared with the normal population.

❑❑❑

Teacher and Student
IF HE WENT TO HELL...

A little girl Meena was talking to her teacher about whales. The teacher said it was physically impossible for a whale to swallow a human because even though a whale is a very large mammal, its throat is very small. Meena stated that Rita was swallowed by a whale. The teacher reiterated that a whale could not swallow a human, it was impossible. Meena said, "When I get to heaven I will ask Rita."

The teacher asked, "What if Rita went to hell?" Meena replied, "Then you ask her!"

DIABESITY

Dr. Th. Premchand Singh
Commonwealth Medical Fellow, UK
Former Professor of Medicine &
I/C Endocrine Clinic, RIMS, Imphal

Obesity is driving escalating Diabesity epidemic: The biggest epidemic in human history-Paul Zimmet.

Diabesity, a newly emerged term of diabetes and obesity has taken more than one billion populations into its grip in past decade. Increasing at an astounding level, diabesity has reached at an epidemic proportion. The parallel increase in obesity and diabetes became apparent in the 1990s and was referred as a single problem expressed as "diabesity." The term was originally coined by Prof Eleazar Shafrir about 15 years ago, although it had hit the headlines more recently.

PREVALENCE:

The prevalence of obesity is increasing rapidly all over the glove especially in developing countries. If this trend persists, by 2030 the absolute number of obese individuals could rise to a total of 1.12 billion, accounting for 20% of the world's adult population. According to the World Health Organization (WHO) worldwide obesity has nearly doubled since 1980 and 42 million children under the age of 5 are overweight or obese in 2013.There has been a massive surge in diabesity in India with estimating number of sufferers in next 20 years at more than 100 million. A study in Delhi has shown 33% men and 55% women are overweight and 76% women in New Delhi have central obesity. The prevalence of type 2 diabetes parallels the increasing prevalence of obesity. According to the International Diabetes Federation (IDF), there are currently 371 million people living with diabetes and 280 people at high risk of developing diabetes and it is estimated that by 2030 half a billion people will be diabetics in the world. While India has 63 million people with diabetes and by 2030, this figure is estimated to go up to 101.1 million. And for every diabetic, there are four more who are pre diabetic.

MEASUREMENTS OF OBESITY :

Obesity represents a state of excess storage of body fat. Normal, healthy men have a body fat percentage of 15-20%, while normal, healthy women have a percentage of approximately 25-30%. The body mass index (BMI), also known as the Quetelet index, is used far more commonly than body fat percentage to define obesity. In general, BMI correlates closely with the degree of body fat in most settings; however, this correlation is weaker at low BMIs.

Although several classifications and definitions for degrees of obesity are accepted, the most widely accepted classifications are those from the World Health Organization (WHO), based on BMI. The WHO designations include the following:

(i) Grade 1 overweight (overweight) - BMI of 25-29.9 kg/m^2. (ii) Grade 2 overweight (obese) - BMI of 30-39.9 kg/m^2. (iii) Grade 3 overweight (severe or morbid obesity) - BMI greater than or equal to 40 kg/m^2.

The cut-off for Asian populations is BMI of 23 kg/m^2 or higher defined as grade 1 overweight and 27.5 kg/m^2 or higher defined as grade 2 overweight (obese). In children, a BMI above the 85th percentile (for age-matched and sex-matched control subjects) is commonly used to define overweight, and a BMI above the 95th percentile is commonly used to define obesity.

OBESITY AND TYPE 2 DIABETES MELLITUS:

The Third National Health and Nutrition Examination Survey (NHANES III) study noted that with increasing overweight and obesity class, there is an increase in the prevalence of diabetes, from 2.4% for normal weight to 14.2% for obesity class 3. With normal weight individuals as a reference, individuals in obesity class 3 had an adjusted odds ratio of 5.1 (95% CI 3.7 to 7.0) for diabetes. The risk of diabetes increases linearly with BMI; the prevalence of diabetes increased from 2% in those with a BMI of 25 to 29.9 kg/m2, to 8% in those with a BMI of 30 to 34.9 kg/m2, and finally to 13% in those with a BMI greater than 35 kg/m2. Prospective studies in non-diabetic overweight adults noted a 49% increase in the incidence of diabetes in 10 years for every 1 kg/year increase in body weight and similarly each kg of weight lost annually over 10 years was associated with a 33% lower risk of diabetes in the subsequent 10 years.

OBESITY AND INSULIN RESISTANCE:

The major link between obesity and type 2 diabetes is insulin resistance. Decreased insulin sensitivity and impaired B-cell function are the two components in the pathogenesis of type 2 diabetes. In the natural history of diabetes, obesity and insulin resistance precede abnormal glucose. Insulin resistance in both of these conditions is manifested by decreased insulin-stimulated glucose transport and metabolism in adipocytes and skeletal

muscle and by impaired suppression of hepatic glucose output. Many studies have pointed to an association between insulin resistance and intra-abdominal fat accumulation (visceral obesity). Visceral adiposity is considered a risk factor for insulin resistance metabolic syndrome and type 2 diabetes. Adipocytokines, hormones secreted by the visceral adipocytes, generate the insulin resistant state and the chronic inflammatory profile that frequently goes along with visceral obesity.

Adipose tissue is a highly active metabolic and endocrine organ. Adipocytes secrete a variety of products known as "adipokines", including leptin, adiponectin, resistin and visfatin, as well as cytokines and chemokines such as TNF-?, IL-6, and monocyte chemoattractant protein-1 all of which also play important roles in the pathogenesis of diabetes, dyslipidemia, inflammation, and atherosclerosis. In addition to inducing insulin resistance in insulin- responsive tissues, adipocyte-derived factors play an important role in the pathogenesis of β-cell dysfunction.

DIABESITY AND GENETICS:

Obesity and diabetes, which are heritable traits that arise from the interactions of multiple genes and lifestyle factors. Genetic studies have provided a molecular basis for the clinically useful classification of monogenic forms of diabetes and obesity. The strongest signal remains the association with variants within FTO (the fat-mass and obesity-related gene). Variants in the fat-mass and obesity-associated gene (FTO), influences susceptibility to type 2 diabetes via an effect on adiposity/ obesity. Other signals near BDNF, SH2B1, and NEGR1 (all implicated in aspects of neuronal function) reinforce the view of obesity as a disorder of hypothalamic function. Finally, genomewide analyses of patterns of fat distribution, prompted by the particularly deleterious health effects of visceral fat accumulation, have characterized approximately 15 loci that are largely distinct from those influencing overall adiposity: many of the 15 display markedly stronger associations in women than in men.

MANAGEMENT OF DIABESITY:

1. Lifestyle modification.

Lifestyle modification includes reduce energy intake and increase physical activity to induce a moderate but sustained weight reduction. Weight loss of 5% to 10% can significantly improve glycaemic control and cardiovascular risk factors in obese individuals with type 2 diabetes. The Political Declaration of the High Level Meeting of the United Nations General Assembly on the Prevention and Control of Noncommunicable Diseases of September 2011 commits to implement the WHO Global Strategy on diet, physical activity and health to prevent obesity.

2. Pharmacotheraphy for diabetes that are weight neutral or helps weight loss.

- Metformin
- Alpha-glucosidase Inhibitors
- Pramlintide
- Glucagon-like peptide-1 receptor agonists.

3. Pharmacotheraphy for obesity.

- Sibutramine
- Orlistat
- Remonabant
- Locaserin hydrochloride

4. Bariatic surgery:

Bariatic surgery helps to reduce blood glucose much before weight loss through a number of mechanisms. Studies have observed that there are altered hormonal and neural signals from GI tract to brain and other organs leading to dramatic effects on hunger and satiety. Both GLP1 and GIP levels are found increased after surgery. Bariatic surgery is indicated in persons with BMI>40% with failure to nonsurgical methods and BMI >35% with comorbid conditions and failure to nonsurgical methods. It has been been reported bariatic surgery was found to be superior to medical therapy in resolving type 2 diabetes, hypertension, and dyslipidemia. Studies have shown that those who undergo bariatric surgery for obese diabetic patients experience complete remission of diabetes, maintaining euglycemia without medications for more than 10 years

CONCLUSION:

Diabesity has become an epidemic worldwide. The development of obesity and diabetes involves complex genetic and environmental factors. Visceral obesity is responsible for the insulin resistance which is a link between obesity and diabetes. Life style modification, pharmacotherapy and bariatic surgery have been advocated for the management of diabesity.

❑❑❑

EXPERIMENT

A professor of chemistry wanted to teach his students a lesson about the evils of liquor, so he produced an experiment that involved a glass of water, a glass of whiskey and two worms.

"Now, class. Observe closely the worms" said the professor putting a worm forst into the water. The worm in the water writhed about, happy as a worm in water could be.

The second worm, he put into the whiskey. It writhed painfully, and quickly sank to the bottom, dead as a doornail. "Now, what lesson can we derive from this experiment?" the professor asked.

Ramesh, who naturally sits in back, raised his hand and wisely, responded, "Drink whiskey and won't get worms."

DISNEY PASSWORD

My kids love going to the web, and they keep track of their password by writting them on Post-it notes.

I noticed their Disney password was "MickeyMinnieGoofyPluto" and asked why it was so long.

"Because," my son explained, "they say it has to have at least four characters."

Relative

A couple drove down a country road for several miles, not saying a word. An earlier disscussion had led to an argument and neither of them wanted to concede their position. As they passed a barnyard of mules, goats and pigs, the husband asked sarcastically, "Relatives of yours?" "Yes," the wife replied, "in-laws."

LECTURES TEACHES

How to yawn without opening mouth
How to sleep with eyes open
How to beleive that this lecture will end soon
How to control our anger
How to text without looking at the text
How to make the tea

1 Tree To Produce Paper, for One Exam.
Join us to Save Trees. Say No to Exams.
Exams Hatao, Trees Bachao

Prof : I dont mind when students look at their watch during lectures.
But it gets on nerves, when they remove their Watch, shake it 2 see is it working.

Teacher : Change this sentence into future tense, "I killed a person"
Students: The future tense is "You will go to jail"

Fine?

Judge : You are accused of driving above speed limits.
What will you take, 3000 bucks or 3 days in jail?

Sukhvinder : I will take the money rather

Expiry Date

Wife : Honey, what are you looking for?

Husband : Nothing

Wife : Why have you been reading our marriage certificate for an hour?

Husband : I was just looking for the expiry date.

CHALLENGES OF DIABETES MANAGEMENT IN INDIA: CURRENT SCENARIO

Prof. Apurba Kumar Mukherjee
Head, Department of Medicine
In-charge Diabetes Division
RG Kar Medical College and Hospital, Kolkata

INTRODUCTION :

India a developing yet economically struggling nation has a huge burden of diabetes mellitus. It is a country with the second highest number of diabetes mellitus in the world with a projection of 79.4 million cases by 2030[1]. The sheer volume of patients and limited infrastructure is in itself a big challenge. Many more problems lead to and add to the challenge. I consider diabetes management as not only treatment of diagnosed patients but find equally (or maybe more) important the prevention of the disease and finding of covert cases.

To highlight the challenges that our country currently faces in the management of diabetes mellitus I would like to impress upon the following 10 challenges we need to aggressively deal with.

Challenge-1

The seeds of 'diabetogenesis' are sown in the womb :

India is indeed a country of paradoxes where some of the world's richest and a huge number of the world's poorest live. There is a huge social and economic divide. Yet there is a point where this divide meets, where maternal nutrition dictates that the seeds of 'diabetogenesis' are sown in the womb. On one hand we have one of the highest numbers of maternal undernutrition in the world, where 1 in 3 women in age group of 18-49 have low BMI (<18.5) and 58% of the pregnant women are anemic[2]. A staggering 8.3 million children are born low birth weight (<2.5kg). India however has also a high prevalence of Gestational Diabetes Mellitus and maternal obesity. Estimates of GDM vary from region to region in India, and the prevalence could be 11 times higher than in Caucasian women[3]. In a survey done in various cities in India in 2002-3 the prevalence of GDM was 16.55%[4]. In Tamil Nadu GDM was seen in 17.8%, 13.8% and 9.9% in pregnant women in urban, semi-urban and rural areas[5]. Both maternal undernutrition and overnutrition and GDM are risk factors for future diabetes mellitus.

Maternal undernutrition results in fetal undernutrition and is compensated by adopting the 'thrifty phenotype'. This results in low birth weight. Here, the growth of organs like abdominal viscera is sacrificed for the growth of the more important organ like the brain, the muscle and bone mass are relatively less than adipose tissue and there is activation of the hypothalamo-pituitary-adrenal stress axis. This result in lower β cell volume, lower nephron mass, low bone and muscle mass and altered endocrine axis: all risk factors for future diabetes and its complications.

Maternal obesity and GDM are risk factors for future GDM and diabetes mellitus in the mother; and obesity and future diabetes in the offspring. Around 50% of women with GDM develop diabetes mellitus in the next 20 years[6]. In the offspring, exposure to high glucose results in fetal hyperinsulinemia, adiposity, macrosomia and future diabetes mellitus and cardiovascular disease.

Thus optimizing maternal nutrition is the number one challenge we face.

Challenge-2

Metabolically Stressful Childhood :

Our education system needs to be revamped where emphasis on physical health should be highlighted. Due to the pressure for academic excellence children hardly get time to exercise and are stuck in a maze of private tuitions even outside school hours. A study by Misra and colleagues found that the prevalence of overweight and obesity in urban children in India were 18.5% and 5.3 % using the WHO criteria for diagnosis of obesity[7]. Childhood obesity is a risk factor for early development of diabetes mellitus and its complications. The data on physical activity in Indian children is sparse. One study showed that physical activity was lower in children >11 years, the total amount of time on television viewing and homework (both sedentary activities) was 52 min/ day and 97.1 min/day in children <11 years and 67.1min/day and 124 min/day in children >11 years[8]. In the same study children with less sleep time (<8.5 hours/ day) were found to be more obese and girls were found to have less physical activity than boys.

The association between childhood obesity and type 2 diabetes mellitus is very strong. Low physical activity results in increased adiposity and low muscle mass (the most insulin sensitive organ in the body) which are risk factors for diabetes mellitus. It is believed that obesity driven type 2 diabetes could become the most common form of newly diagnosed diabetes in adolescents in the near future[9].

Decreasing pressure for academic excellence in children, increasing physical activity, reducing screen time, improving sleep and providing a favourable environment for physical activity at school and in the neighbourhood is our next big challenge.

Challenge-3

Westernization and overcrowding :

We have successfully aped the many of the actions of the westerners regarding our food and lifestyle choices. Sadly, we have failed to learn their precautions. It is mandatory by FDA for all food products be labelled for calorie and nutrient content. Very recently the FDA has directed for labelling in restaurant foods also. However in India the presence of calorie dense, nutrient poor food is rampant without any quality control. The worst impact is on the urban population, especially the urban poor who find the calorie rich food cheaper and more filling than healthier items like vegetables, whole grains and fruits.

Overcrowding and lack of space for physical activity is another major concern. Patients often complain that there are not adequate, safe and

pollution free walking places in their locality and thus physical activity is often compromised.

Food quality control and urban/rural planning for adequate physical activity is our next important challenge.

Challenge-4
Ignorance, Misconception and Misinterpretation :

India continues to be a country of myth, sooth-sayers and faith-healers. There is immense myth and ignorance surrounding diabetes, its treatment and food choices. Many patients discontinue diabetes treatment believing that their diabetes is 'cured', some other practice intense dietary restriction to the point of malnutrition and risk of ketosis, as they believe that once they start with treatment, they will become 'dependent ' on it. Patients are often unaware that diabetes may be asymptomatic for long and are ignorant of the complications of diabetes. Some other menaces in the management of diabetes are the various forms of alternative therapy promising everything under the sun and the lakhs of quacks who provide harm than benefit.

Creating awareness through education by responsible diabetes organisations; and media and government agencies is required. This is already being done by the professional diabetes bodies but more intensification is needed.

Challenge-5
India specific diabetes mellitus presentation and complication :

In India diabetes mellitus sets in nearly a decade earlier than in more developed nations. The data on the prevalence of undiagnosed diabetes is inadequate and there is a large population with pre-diabetes. In the SITE study, a multi-centric study in India enrolling 15662 patients, the prevalence of diabetes was 34.7%, of undiagnosed diabetes was 7.2% and 18.4% had pre-diabetes[10]. However actual figures nation-wide is expected to be much higher.

In the DiabCare India 2011 study, a cross-sectional study done in tertiary referral centres in India mean HbA1c of patients with diabetes on treatment was 8.9±2.1%, almost 2% higher than the ADA targets[11]. The reasons for poor glycemic control are late presentation by patients often with complications, physician hesitation for intensification of treatment due to ignorance or fear of insulin initiation thereby missing out on the precious 'window period' where 'metabolic memory' can be manipulated. In the same study, 93.2% were on oral anti-hyperglycemic agents and 35.2% were on insulin. Insulin initiation is delayed in India due to both physician and patient factors. The important contributing factors are fear of injection, cost, fear of hypoglycaemia, physician unawareness about dose and titration and the belief that the disease has reached its terminal state and that the patient has failed.

Macrovascular complications like coronary artery disease and peripheral vascular disease are more common in Indians than the western population[12] . This is because of longer duration of diabetes and pre-diabetes, late initiation of treatment and inadequate control of other risk factors. Microvascular complications are less common than in the west. However in the DiabCare India 2011 study neuropathy was the most common complication seen in 41.4% patient.

Another very pertinent problem especially in India is the diabetic foot disease. Many factors contribute to causation and worsening of diabetic foot disease. High prevalence of peripheral vascular disease, neuropathy, social and religious practice of walking bare-foot, and dirty environment all contribute. Moreover the podiatry care in India can at most be described as grossly inadequate, with the facility lacking in many of the referral institutes too. As a result around 1 lakh amputations are carried per year due to diabetic foot related complications. The science of podiatry has advanced significantly from scientific dressing of wounds, to wound debridement, off-loading and stem cell therapy. This is a particularly difficult challenge we need to handle.

Other challenges in the diabetes management in India is insufficient support team like nutritionists, diabetes nurse, diabetes care educators, physiotherapists and psychiatrists and psychologists. Many of the above mentioned support departments are providing service at an individual level, but proper co-ordination is lacking.

Challenge-6
Limited and inadequate accessibility to health care facilities:

The doctor-population ratio in India is 1:1800; which is somewhat less than the ratio of 1:1000 suggested by 'High Level Expert Group (HLEG) for Universal Health Coverage' constituted by the Planning Commission[13]. The ratio is worse in the rural areas. However, what India actually faces is severe shortage of specialist doctors and advanced health care facilities in both rural and urban services. There is lack of adequate infrastructure for optimal diagnosis and management of diabetes even in the existing health care facilities. In the process a large number of private diagnostic laboratories have mushroomed in urban, semi-urban and even rural areas without any quality control and liability.

Streamlining of medical education so that it can be more productive, training of support staff and health workers, intelligent and effective division of work related to diabetes care, improving the quality of the existing hospitals and health care facilities, strict quality control and penalisation for those who default, improvement of roads, railways and other means of transport are some of the ways we can improve diabetes care at a faster and more effective way than merely increasing the number of hospitals. We need quality and speed more than numbers.

Challenge-7
Dismal economics of healthcare:

India belongs to the BRICS group of nations, a group of 5 major emerging national economies (Brazil, Russia, India, China and South Africa). Yet we are a poor nation. Our diagnosis of Below Poverty Line (BPL) is those spending less than Rs. 32/day in the rural areas and Rs. 47/day in the urban areas. Researchers using simulation models have found out that the lifetime direct cost of treating diabetes is $85000 per person. This is an amount we in India cannot even dream of. In India, for a low income Indian family with an adult with diabetes, as much as 25% of family income may be devoted to diabetes care[14]. Over and above this there is the indirect costs like absenteeism from work, job-loss etc. There is also the intangible loss like pain, depression and anxiety which can be felt but not measured.

India spends just 6% of its GDP on healthcare, whereas it has 21% of the world disease burden. It ranks among the last 5 countries in the world on public health spending. Less than 15% of the population are covered through health insurance and most of it covers only government employees[15]. Over 80% of health financing is private financing[15]. Thus the economics of healthcare is in a dismal state. A National Health Policy looking into all aspects of health care is the urgent need of the hour.

Challenge-8
Missing out on other diabetes types:

India has the highest prevalence of Fibrocalcific pancreatic disease (FCPD in the world. V Mohan et al found that 0.36% of the diagnosed diabetes had FCPD[16]. However the disease is often not suspected and frequently missed. Pain is a common complaint in India, but steatorrhoea may not be so common, as it frequently occurs in the low income group who consume a low fat diet. The importance of identifying FCPD is for control of diabetes, for control pancreatic pain, for pancreatic enzyme supplements and for detection of pancreatic-adenocarcinoma[17].

Challenge-9
Physician inadequacies :

A significant percentage of patients with diabetes get treatment from General Practitioners. In a study conducted in various centres in urban India treating diabetes mellitus, almost 50% of the patients were getting treatment from General Practitioners. In the same study Diabetologists and Consulting Physicians more frequently prescribed insulin compared to GPs[18]. This may suggest that they are seeing patients early in the disease or are less aggressive in their treatment. Unfamiliarity with recent protocols, unawareness about monitoring and dose adjustments due to lack of training and update could be few of the reasons. Diabetes science is a rapidly advancing science with changing guidelines and recommendations and continuing medical education is needed on a regular basis.

Challenge-10
Passive government initiative and policy:

The government and policy makers need to wake up to the need of the hour. They need an elite team of doctors, scientists, economists and administrators to deal with this rising threat of diabetes.

DEAF GRANDMA

Two young boys were spending the night at their grandparents the week before Diwali.

At bedtime, the two boys knelt beside their beds to say their prayers when the youngest one began praying at the top of his voice.

Diwali

"I pray for a new bicycle!", "I pray for a new jeans!"

"I pray for a new mobile!"

His older brother leaned over and nudged the younger brother and said, "Why are you shouting your prayers? God isn't deaf." To which the little brother replied, No, but Grandma is!"

SMART KID

A Sweet demand by a kid.

A kid was beaten by his mom.

Dad came and asked-what happen son?

Kid said - I can't adjust with your wife anymore, I want my own.

MY DOG

TEACHER : Kirti, your composition on "My Dog" is exactly the same as your brother's. Did you copy his?

KIRTI : No, teacher, it's the same dog... we both wrote on!!!

REFERENCES

1) Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030. Diabetes Care 2004; 27:1047-53.
2) National Family Health Survey (NFHS 3), 2005 - 06, India: Volume I, & National Fact Sheet, International Institute for Population Sciences, Mumbai, September 2007
3) Seshiah V, Das AK, Balaji V, Joshi SR, Parikh MN, Gupta S; Diabetes in Pregnancy Study Group. Gestational diabetes mellitus--guidelines. J Assoc Physicians India 2006; 54:622-8.
4) Seshiah V, Balaji V, Balaji MS, Sanjeevi CB, Green A. Gestational diabetes mellitus in India. J Assoc Physicians India 2004; 52 : 707-11
5) Seshiah V, Balaji V, Balaji MS, Paneerselvam A, Arthi T, Thamizharasi M, et al. Prevalence of gestational diabetes mellitus in South India (Tamil Nadu) - a community based study. J Assoc Physicians India 2008; 56 : 329-33
6) Yogev Y, Langer O. Pregnancy outcome in obese and morbidly obese gestational diabetic women. Eur J Obstet Gynaecol Reprod Biol. 2008;137:21-26.
7) Misra A, shah P, Goel K et al.The high burden of obesity and abdominal obesity in urban Indian school children: a multicentric study of 38,296 children. Ann Nutr Metab. 2011;58(3):203-11
8) Sumathi Swaminathan, Sumithra Selvam, Tinku Thomas, Anura V. Kurpad & Mario Vaz. Longitudinal trends in physical activity patterns in selected urban south Indian school children. Indian J Med Res 134, August 2011, pp 174-180
9) American Diabetes Association. Type 2 diabetes in children and adolescents. Pediatrics 2000; 105 : 671-80
10) Joshi SR et al. Prevalence of diagnosed and undiagnosed diabetes and hypertension in India--results from the Screening India's Twin Epidemic (SITE) study. Diabetes Technol Ther. 2012 Jan;14(1):8-15. doi: 10.1089/dia.2011.0243. Epub 2011 Nov 3
11) V Mohan et al. Current status of management, control, complications and psychosocial aspects of patients with diabetes in India: Results from the DiabCare India 2011 study. Indian Journal of Endocrinology and Metabolism/May-Jun 2014/Vol 18| Issue 3
12) Melton LJ, Macken KM, Palumbo PJ, Elveback LR. Incidence and prevalence of clinical peripheral vascular disease in a population-based cohort of diabetic patients. Diabetes Care 1980; 3 : 650-4
13) High Level Expert Group Report on Universal Health Coverage for India Planning Commission of India New Delhi, November, 2011. http://planningcommission.nic.in/reports/genrep/rep_uhc0812.pdf
14) Health Administrator Vol: XXII Number 1& 2 - 2009 : 110-112
15) J Anita. Emerging Health Insurance in India - An overview. 10th Global Conference of Actuaries
16) Mohan V, Nagalotimath SJ, Yajnik CS, Tripathy BB. Fibrocalculous pancreatic diabetes. Diabetes Metab Rev 1998; 14:153-70.
17) Augustine P, Ramesh H. Is tropical pancreatitis premalignant? Am J Gastroenterol 1992; 87:1005-8
18) Anil Kapur et al. Diabetes Care In India: Physicians Perceptions, Attitudes And Practices. Int. J. Diab. Dev. Countries (1998), Vol. 18: 124-130.

❑❑❑

DIABETES AND CARDIO-VASCULAR RISK

DR. PRITOM KUMAR BORTHAKUR, M.D.

INTRODUCTION :

A large body of epidemiological and pathological data documents that diabetes is an independent risk factor for cardiovascular disease in both men and women. Women with diabetes seem to loose most of their inherent protection against developing CV disease. 65 % of patients with diabetes die of cardiovascular diseases. When patients with diabetes develop CV disease , they sustain worse prognosis of survival than do patients without diabetes. Therefore diabetes is considered as major cardiovascular risk factor.25% of diabetic individuals on diagnosis already have CV disease. Patients with Impaired fasting glucose and IGT also has high incidence of CV disease and also increased mortality related to CV disease. Large vessel atherosclerosis can precede development of diabetes suggesting that both conditions may share genetic and environmental antecedents, a common soil. American heart Association in 1999 stated that diabetes is a cardiovascular disease.

Myocardial ischaemia may occur without symptom in patients with diabetes. multivessel atherosclerosis is often present before ischaemic symptoms occur and before treatment is instituted. A delayed recognition of various forms of CHD undoubtedly worsens prognosis for survival for many diabetic patients.

PATHOPHYSIOLOGY :

Traditional risk factors cluster in patients with diabetes . The onset of hyperglycaemia in patients with metabolic syndrome accelerates the process of atherogenesis. Patients with IFG and IGT should also be considered as risk factor of CV disease as it has been seen that the incidence of CV disease and mortality related to CV disease is high in patients with diabetes.

The pathophysiology of DM and CVD is complex and multifactorial. Hyperglycaemia is likely to directly influence atherosclerosis development. Endothelial dysfunction, vascular effects of advanced glycated end products, adverse effects of circulatory FFAs and systemic inflammation are the mechanisms of increased cardiovascular events in patients with diabetes.

The mechanisms of endothelial dysfunction includes ..abnormal nitric oxide biology, increased endothelin and angiotensin II , reduced prostacyclin activity etc. Abnormalities in lipid metabolism or diabetic dyslipidaemia contributes to atherosclerotic process . diabetic dyslipidaemia is characterised by high triglycerides, low HD cholesterol and high small dense LDL values. These small dense LDL particles are more susceptible for oxidation. Oxidized LDL is proatherogenic as it produces several biological responses such as attracting leukocytes to the intima of the vessels, stimulating proliferation of leukocytes , endothelial cells and smooth muscle cells which step in the formation of atherosclerotic plaque. Direct vascular effect of diabetes s also compounded by perturbed proteofibrinoltic system and altered platelet biology. There occurs increased level of circulating tissue factor, factor VII , vWF, PAI 1 and decreased level of antithrombin III and protein C.

Increased systemic inflammation also increases diabetic atherosclerotic process . diabetes is associated with lipid rich atherosclerotic plaque and increased inflammatory cell infiltration, increased expression of tissue factor and increased expression of receptors for advanced glycated end products.

CHD IN PTs WITH DM :

Coronary heart disease is the major cause of morbidity and mortality in patients with diabetes. CHD affects as many as 55% patients of diabetes. Results of Framingham study found that diabetes doubles the age adjusted risk for CVD in men and tripled it in women. Similar data have been reported by the multiple Risk Factor Intervention trial (MRFIT). Sudden cardiac death was 50% more frequent in diabetic men and by 300% more frequent in diabetic women compared to age matched non diabetic. Multivessel disease is much more common in patients with diabetes compared to non diabetic .

STROKE IN PTs WITH DM :

Mortality from stroke is increased 3 fold when patients with diabetes are matched with those without diabetes. The most common site of cerebrovascular disease in patients with diabetes is occlusion of small paramedical penetrating arteries. Diabetes also increases the likelihood of severe carotid atherosclerosis. Approximately 13% of patients with diabetes more than 65 yrs old have had a stroke.

HEART FAILURE AND CARDIOMYOPATHY

Patients with diabetes are unususally prone to congestive heart failure. Several factors probably underlie diabetic cardiomyopathy : severe coronary atherosclerosis, prolonged hypertension, chronic hyperglycaemia, microvascular disease, glycosylation of myocardial proteins and autonomic neuropathy. Diabetic cardiomyopathy can be defined as myocardial damage in apatient with diabetes that cannot be attributed to any other known factor . myocardial damage in the absence of coronary artery disease is most likely related to microvascular dysfunction. This may lead to myocardial injury, fibrosis and hypertrophy. In addition the underlying defects of inflammation, and oxidative stress contribute to diastolic dysfunctionespecially in the setting of poor metabolic control.

PAD IN PTs WITH DM :

Diabetic patients are at high risk for peripheral arterial disease characterised by symptoms of intermittent claudication or critical limb ischaemia. Ankle -brachial pressure index has emerged as the non invasive, inexpensive tool for diagnosis of PAD. An ABI of < 0.9 is not only diagnostic of peripheral arterial disease , but is also an independent marker of increased morbidity and mortality from cardiovascular disease. Evaluation must include palpation of foot pulses and examination to find femoral bruit. Cardiovascular morbidity and mortality are markedly increased in patients with peripheral arterial disease ; these patients have overall mortality at 5 years of 50%.

Severe lower extremity ischaemia and extensive tissue loss may occur without pain, frequently because of concomittent neuropathy.

QUESTIONS AND ANSWERS

Q. Why did the teacher wear sunglusses?
A. Because her class was so bright!
Q. Why were the teacher's eyes crossed?
A. She couldn't control her pupils!
Q. Teacher : Didn't I tell you to stand at the end of the line?
A. Student : I tried but there was someone already there!
Q. Why did the teacher go to the beach?
A. To test the water.
Q . Why did the teacher turn the lights on?
A. Because her class was so dim.
Q. Why did the teacher write on the window?
A. Because she wanted the lesson to be very clear!
Q. Why is Children's day celebrated on 14th of November?
A. It is because it comes exactly 9 months after Valentine's Day that is on the14th of February!
Q. Which country has banned Children's Day forever?
A. China because they have to give away too many gifts!
Q. Who does not go to school on Children's Day?
A. All the teachers in the world. They really deserve a break because for them everyday is Children's day.
Q. What was the most popular dance in 1947?
A. Indepen-dance!
Q. What makes music on your head?
A. A head band!

RISK ASSESSMENT IN DIABETIC PATIENTS :

Risk assessment must take into account the major risk factors viz hypertension, smoking, abnormal lipids, hyperglycaemia, and the predisposing risk factors viz family history of CAD, obesity , physical inactivity etc.

CLINICAL EVALUATION :

There is increased likelihood of sudden cardiac death and unrecognised myocardial infarction in patients with diabetes . Acute ischaemic syndrome, peripheral arterial disease, and advanced CVD complications occur more frequently in patients with diabetes. The diagnosis of MI may be delayed or missed as the typical sysmptoms are masked. Effective strategies of early detection of CVD could reduce morbidity and mortality.

HISTORY :

Assess carefully for claudication , angina, dyspnoea on exertion.

Physical examination : routine cardiovascular examination, assess for femoral and carotid bruits , evaluate peripheral artery pulses , ratio of ankle-brachial artery systolic pressure . Look for postural hypotension.

INVESTIGATION :

- Check for microalbuminuria.
- ECG : LVH strong predictor of CHD morbidity and mortality.
- CT coronary angiography (Coronary calcium score highly correlated with total coronary atherosclerosis burden).
- Carotid ultrasound : Detects subclinical carotid atherosclerosis.
- Echocardiography : Diastolic dysfunction, systolic dysfunction, RWMA.
- Ambulatory ECG monitoring can detect silent myocardial ischaemia
- Stress testing to detect myocardial ischaemia
- Pharmacological stress test or perfusion scintigraphy.

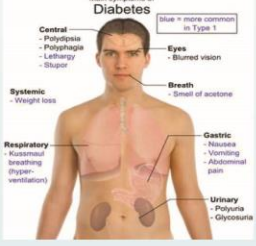
CARDIOVASCULAR CLINICAL MANAGEMENT :

Ccomprehensive medical management extends overall survival, improves quality of life, decreases the need for intervention, and reduces the incidence of subsequent myocardial infarction. Agressve risk reduction with medical therapy will delay or eliminate the need for revascularisation in most cases. Treatment of risk factors in patients with established CHD is called secondary prevention. Studies show diabetic patients respond to secondary prevention interventions at least as well as patients without diabetes. Consequently, the general guidelines for non invasive medical management in secondary prevention can be applied when patients with diabetes have clinical atherosclerotic disease.

Primary prevention of CVD in diabetic patients. : goals for smoking cessation , Blood pressure control , physical activity, weight management are same as that of non diabetic patients. However, more aggressive management of lipids is indicated for diabetic patients . target for glycaemic control should be to achieve a target HbA1C of around 7%.

PRIMARY PREVENTION OF CVD IN DIABETICS

RISKS	GOAL
Smoking	Complete cessation
Blood presuure	Less than 130/85 mmHg.
Lipids	Primary goal LDLc < 100 mg %. Diabetic with additional risk factors < 70 mg%. Secondary goal HDL >35 mg%, TG < 200mg % .
Glucose control	Near normal fasting glucose. HbA1C < 7%.
Antiplatelet	Aspirin 80 to 325 mg in all diabetics with additional CV risk .
Physical activity	30 minutes of moderate intensity exercise for 4 -5 times per week.
Weight	Achieve and maintain BMI : 21 to 25 .kg/m2 Waist circumference < 102 cm for men and < 88 cm for women



Fine ?

A TOUGH Surinder enter into a restaurent and ordered for empty tumbler and a lemon. He asked everyone to look as he squeezed the lemon into the glass with his powerful hands.

"If anyone here can get as much out of a lemon as I have I will give him 50 rupees."

A thin, bespectacled clerk accepted the challenge. With his frail hands he got more juice out of the lemon than the Surinder.

Wonderful! ecclaimed the Surinder. handing over the fifty, "but tell me how did you manage to squeeze out more than I?

"I am from the income tax departmen," replied the little fellow.

WORLD DIABETES DAY CELEBRATION BY NEDS ON 14TH NOVEMBER 2014

Press conference for World Diabetes Day


Sports Journalist press meet at Nehru Stadium


Press Conference in presence of Nishita Goswami & Kapil Borah


Actress Nishita Goswami being felicitated by Dr B. Bhattacharya

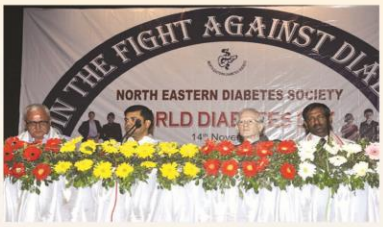
Diabetes Rally

Diabetes Awarness Rally

School Childrens with awarness posters

Balloon Release Ceremony at Dighalipukhuri


Actress Nishita Goswami sharing time with Ty1 childrens



Diabetes awarness meet at District Library

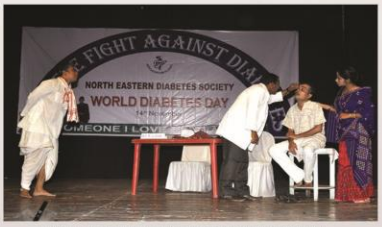

Half marathon prize being Given by guest of honour Mr. H.K. Deka


Half marathon prize being Given by Chief guest Ajay Tewari, IAS

Ty1 Patient Miss Bhupali Sharing her experience

Ambulance service of NEDS inagurated by Dr. NN Barman


Inter School Quiz Competition at District Library



Drama on Diabetes at District Library

Poster Competition at District Library


Half marathon Prize District Library by Dr. M. Saikia


Prize Distribution Ceremony on 14 Nov at District Library


Health Camp Inaugurated By Dr. N.N. Barman