DIABETES KOTECHA Shreti

Diabetes in Malaysia as a Chronic Model of Disease

Diabetes Mellitus holds a universal title as a major aetiological pre-requisite for mortality and morbidity. The chronic nature of the disease and associated co-morbidities allow Diabetes to lay claim to not only the consumption of lives but the provisions of healthcare and economic resources. The centerpiece of this discussion consists of type II DM which has been implicated as a key ingredient for chronic disease.

Much of the global burden is expected to come from the western pacific however; regions of South East Asia are also responsible.

| | | |
|---|---|---|
| Total world population (billions) | 7.0 | 8.4 |
| Adult population (20-79 years, billions) | 4.3 | 5.6 |
| **Diabetes and IGT (20-79 years)** | | |
| **Diabetes** | | |
| Global prevalence (%) | 6.6 | 7.8 |
| Comparative prevalence (%) | 6.4 | 7.7 |
| Number of people with diabetes (millions) | 285 | 439 |
| **IGT** | | |
| Global prevalence (%) | 7.9 | 8.4 |
| Comparative prevalence (%) | 7.8 | 8.4 |
| Number of people with IGT (millions) | 344 | 472 |

In Malaysia the Third National Health and Morbidity survey showed a prevalence of 14.9% T2DM in adults aged over 30 years. In the duration of 10 years (1996-2006) this has increased by approximately 79.5%. The prevalence of T2DM among the Indian ethnic group is highest 19.9% in those more than 30 years old.

By definition diabetes is where there is an excess of circulating blood glucose concentrations where venous plasma glucose values are used [see figure2]. It is apparent that a physiological insulin resistance takes place and to a lesser degree an impairment of β cell function.

| Diagnostic Criteria for Diabetes | | |
|---|---|---|
| Fasting plasma glucose: ≥ 7.0 mmol/l (126mg/dl) | | |
| Random plasma glucose: ≥ 11.1 mmol/l (200mg/dl) | | |
| Interpretation of 75g oral glucose tolerance test: | | |
| | Venous Plasma Glucose mmol/l | |
| | Fasting | 2 hrs after 75g glucose load |
| Normal glucose levels: | ≤ 6.0 | ≤ 7.8 |
| Impaired fasting glucose: | 6.1-6.9 | - |
| Impaired glucose tolerance: | - | 7.8-11.0 |
| Diabetes Mellitus: | ≥ 7.0 | ≥ 11.1 |

Table 1:Current guidelines used to diagnose diabetes

Recent proposals state that HBA1c value >6.5% on two occasions is in line with a diagnosis of DM.

**Screening and Diagnosis**

1 – Screen for diabetes using fasting plasma glucose (FPG)performed annually in those with risk factors and those >30years

2 – Children and adolescents at risk of developing diabetes screened initially at 10 years/onset of puberty. Screening is every two years.

3. – In those with additional risk factors for diabetes more frequent and/or earlier testing with either FPG or 2 hour plasma glucose in 75g OGTT.

4. – Test OGTT in those presenting with borderline fasting glucose values.

5. All newly diagnosed T2DM need to be reviewed by medical doctors in which screening for other cardiovascular risks need to be done/planned.

| Typical presenting features of Type 2 diabetes. | |
|---|---|
| Very rarely asymptomatic | Patients are identified through chance screening for a co-existing ailment. |
| Osmotic indicators | Polydipsia, polyuria, nocturia, excessive fatigue, malaise visual disturbance. |
| Infection | Infections are likely to be recurrent including bacterial urinary tract infections and fungal candidiasis particularly affecting the genital regions.<br>Dermatological eruptions – granuloma annulare |
| Co-morbidities | Obesity, hypertension, dyslipidaemia (metabolic syndrome) |
| Macrovascular complications | **Cardiovascular atherosclerosis:** Angina Pectoris, ACS, Myocardial Infarction<br>**Peripheral Vascular:** Intermittent claudication, Poor wound healing and ulcer formation. Ischemic limbs and rest pain<br>**Cerebrovascular:** Transient Ischemic attacks and stroke |
| Microvascular complication | **Diabetic Retinopathy**: Progressive visual loss<br>**Diabetic Nephropathy**: Hypertension, proteinuria, microalbuminuria, nephrotic syndrome.<br>**Diabetic Neuropathy**: glove and stocking, diabetic foot, CN palsies, nerve entrapment, amyotrophy. |
| Additional conditions | Ocular impairments including cataracts and glaucoma. |

Table 2: Associated features of diabetes commonly seen during presentation

At diagnosis a detailed history, physical examination including fundoscopy must be done to assess risk factors and complications. The following baseline investigations include HBA1c, renal profile, lipid profile, urine analysis particularly for albuminuria and ECG.

The management of T2DM requires an integrated and holistic approach including the management of associated hypertension, dyslipidaemia and obesity to reduce complications of Diabetes.

Recent studies have shown early and aggressive reduction in blood glucose levels to target a reduction of complications and reducing healthcare cost. Initially lifestyle factors should be focused on with diet and physical activity form an integral part of management. Education should be initiated at diagnosis and reinforced regularly. Self care includes blood glucose monitoring, body weight monitoring, foot care, personal hygiene, stop smoking and reduce alcohol. If lifestyle control is inadequate oral pharmacological hypoglycaemic medications usually suffice and are the mainstay of treatment without insulin dependence.

| Common Diabetic Hypoglycaemic Drugs |
| --- |
| ***Biguanides (Metformin)*** = Most extensively used agent 1st line drug of choice for obese type 2 diabetics. It has many metabolic effects but functions principally to act against insulin resistance. It acts directly to reduce glucose concentration by reducing hepatic gluconeogenesis and thus increasing sensitivity to insulin. Metformin increases insulin stimulated glucose uptake and promotes glycogenesis in skeletal muscle. Can be combined with all other anti-diabetic drugs.<br><br>Gastro-intestinal side effects common with initiation of treatment and may persist in some patients. The most serious but rare side effect is lactic acidosis. |
| ***Sulphonylureas*** = Mode of action is to stimulate insulin secretion as they bind to specific receptors on pancreatic β cells. The efficacy of these drugs is dependent on β cell function. Long acting (chlorpropamide), intermediate (glibenclamide), short acting (tolbutamide) and modified release (gliclazide) preparations are available. Can be taken in combination with other preparations. They encourage weight gain so prescribed with caution in obese individuals when dietary attempts and metformin are inadequate.<br><br>Adverse effects include risk of hypoglycaemia, mild gastro-intestinal disturbance and hyponatramia. Occasional rare effects include deranged liver function, hepatitis, hepatic failure and haematological changes. |
| ***Thiazolidineiones (Pioglitazone, Rosiglitazone)*** = Function to improve insulin sensitivity via stimulation of nuclear receptor PPARγ which is mainly expressed in adipose tissue. Acts to promote lipogenesis. Generally used in combination with metformin or sulphonylurea when glycaemic control is inadequate with existing treatment. NICE recommendations advise continuation of thiazolidineiones if HbA1c is reduced by 0.5% 6 months post treatment.<br><br>Adverse effects include fluid retention, anaemia and reduced haematocrit. |
| ***α-glucosidase inhibitors (Acarbose)*** = Reduce intestinal rate of carbohydrate digestion reduces post |

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| prandial hyperglycaemia.<br><br>Side effects include gastrointestinal disturbance. |
| ***Meglitinide analogues (Repaglinide)*** = Benzamido compounds which are taken before meals to stimulate insulin secretion. Also bind to SUR receptor on pancreatic β cells. Rare sensitivity reactions. |
| ***Glp 1 agonists ( Byetta® - Exenatide, liraglutide)*** =Belongs to a class of drugs known as incretin mimetics as have a mode of action to bind and activate the incretin hormone glucagon like peptide 1 receptor to stimulate insulin secretion. The receptor activation inhibits glucagon secretion and lengthens gastric transit reducing intestinal glucose absorption. Glp-1 reduces appetite, and may promote weight loss. Licensed for use in combination with metformin +/- sulphonylurea, administered via subcutaneous injection. Side effect profile includes nausea, hypoglycaemia, vomiting, diarrhoea, headaches and rare association with acute pancreatitis [103]. |
| ***Insulin*** = As type 2 diabetes is a progressive condition, one may eventually require insulin when glucose control cannot be achieved by oral hypoglycaemic agents and complications co-exist. It comes in the forms of animal, human and human insulin analogues. Administration via injection (subcutaneous) as insulin is degraded by gastro-intestinal enzymes. There are many preparations available ranging from rapid (Lispro) short (Actrapid) short-intermediate (Mixtard) Intermediate (Insulatard) long (Ultratard) and prolonged (Glargine). The rapid acting analogues have a shorter duration of action and convenient for injection shortly before or after meals. The short acting soluble insulin is useful in diabetic emergencies (DKA). Treatment begins with short acting preparations during the day, and the use of intermediate/long acting analogues at bedtime. The dosage of insulin is gradually increased according to individual patient requirements.<br><br>Side effects include weight gain, hypoglycaemia, transient oedema, fat hypertrophy at injection site. Rare hypersensitivity reactions can occur. |

Despite significant advances in medicine no cure for Diabetes has been found. Symptomatic treatment is the mainstay of management. Therefore, diabetes mellitus remains a major medical challenge in the 21st century. Urbanised western lifestyles coupled with physical inactivity and increased dietary saturated fat with a genetic predisposition has impacted on the population. In Malaysia prevalence of DM continues to increase with almost half the population oblivious to having the disease. There is a critical need for increased screening at primary care to educate on lifestyle modification and increase physical activity.

Reference List

Watkins, P. J. ABC of Diabetes. Fifth ediition ed. London: BMJ Publishing Group LTD, 2003.

Colwell, J. A. Diabetes Hot Topics. illustrated ed. Elsevier Health Sciences, 2003, 2003.

Porte, D., R. S. Sherwin, and A Baron. Ellenburg & Rifkin's Diabetes Mellitus. sixth ed. McGraw-Hill, 2003.

Obesity and Diabetes. Ed. A. H. Barnett and S. Kumar. Second Edition ed. London: Wiley-Blackwell, 2009.

McDowell, J. R. S., F. J. Brown, and Matthews D.M. Diabetes: a Handbook for the Primary Care Healthcare Team. Ed. J. R. S. McDowell, F. J. Brown, and Matthews D.M. 2nd illustrated ed. Elsevier Health Sciences, 2007.

Bouzakri, K., H. A. Koistinen, and J. R. Zierath. "Molecular mechanisms of skeletal muscle insulin resistance in type 2 diabetes." Curr.Diabetes Rev. 1.2 (2005): 167-74.

Lorenzo, C., et al. "Insulin resistance, beta-cell dysfunction, and conversion to type 2 diabetes in a multiethnic population: the Insulin Resistance Atherosclerosis Study." Diabetes Care 33.1 (2010): 67-72.

Gallwitz, B. and H. U. Haring. "Future perspectives for insulinotropic agents in the treatment of type 2 diabetes-DPP-4 inhibitors and sulphonylureas." Diabetes Obes.Metab 12.1 (2010): 1-11.

## APPENDIX 4

### Student's SSC 5c (Elective Report) and Completed Risk Assessment

This information will be used to monitor placements for safety and to provide useful information that we can pass on to students for the future.

Name: SHRUTI KOTECHA

Dates of elective: 14/04/2011 → 12/05/2011

Elective address: LANGKAWI HOSPITAL, LANGKAWI

Elective contact / Supervisor: DR. AZIZ HOSPITAL DIRECTOR

Contact address / Telephone / E-mail of elective placement: 04 - 966 3433

Subject: DIABETES IN MALAYSIA AS A CHRONIC MODEL OF DISEASE

Clinical experience: A+E, GENERAL SURGERY, OBS & GYNAE.

Good points: ALL HOSPITAL STAFF VERY FRIENDLY AND WILLING TO TEACH

Shortcomings: FALSE ADVERTISING BY MEDICS AWAY FEEL RIPPED OFF

Deviations from risk assessment: Nil

Accommodation: AVERAGE LESS THAN EXPECTED

Travel arrangements: SHOULD HAVE BEEN ORGANISED BY MEDICS AWAY BUT THEY FAILED TO DO SO.

Other experiences and information useful to future students:

DO NOT BOOK ELECTIVE THROUGH MEDICS AWAY AS THEY ARE QUICK TO TAKE YOUR MONEY BUT THEN IMPOSSIBLE TO CORRESPOND WITH. THEY RIP YOU OFF AND DONT GIVE YOU WHAT THEY ADVERTISE. ACCOMODATION WAS FAR AWAY FROM THE HOSPITAL AND THEY DON'T SUPPLY TRANSPORT. IT IS BETTER AND CHEAPER TO ORGANIZE THE ELECTIVE BY YOURSELF THEN TO PAY MEDICS AWAY WHO DON'T DO ANYTHING.

**The elective assessment must be completed to provide evidence of satisfactorily completing your elective. You must also provide a completed risk assessment form (from appendix 2).**

**You will need to provide hard copies of Appendices 2, 3 and 4 to the Student Office within one week of the completion of your elective at the absolute latest. Remember that you will not be able to pass year 5 without having provided the evidence that you have satisfactorily completed your elective.**