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Impact of Structured Teaching Program on Nurses Knowledge Regarding Type1 Diabetes Mellitus And Insulin Administration Amongst Nurses Working In Kosti Teaching Hospital 2018 White Nile State – Sudan.

A thesis submitted for the fulfillment of PhD

In pediatric nursing

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2018

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اقْرَأ بِاسمِ رِبكَ الِذي خَلَقَ (١) خَلَقَ الانسانَ مِن عَلَقٍ (٢) اقرَا ورَبُكَ الأَكرَمُ(١) اَلِذي عَلَمَ بِالقَلَمِ عَلَمَ الإِنسانَ مَا لَم يَعلَم(٥)۞

صدق الله العظيم

سورة العلق الآيات (١- ٥)

Dedication

To my parents ...

...

To my brothers and sisters ...

To my children

...

To my husband

…

To my colleagues and friends ...

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1.Introduction

Diabetes mellitus is a chronic disorder characterized by abnormalities in the metabolism of carbohydrate, protein and fat. [1]

Diabetes management in children and adolescents requires multiple daily management tasks which can challenge caregiver. Nevertheless, the scientifically proven long - term health benefits of optimal diabetes control mandate that best efforts be made to control diabetes at school as well as at home.[2,3,4] Diabetes is one of the most common diseases in school – age children. According to the 2011 national diabetes fact sheet , about 215/000 young people in the US under age 20 had diabetes in 2010. This represents 0.26 percent of all people in this age group. [5]

Based on data from 2002 to 2005 , the SEARCH for diabetes in youth study reported that approximately 15,600 US youth less than 20 years of age were diagnosed annually with type 1 diabetes and the estimated overall prevalence for type 1 diabetes in youth is approximately 154 cases per 100/000 youth. [6,7] The National Diabetes Education Program estimated 75 % of all newly diagnosed cases occur in individual under 18 years of age.[8]

Today, almost a century after the discovery of insulin, the most common cause of death in a child with diabetes, from a global perspective, is lack of access to insulin or improper use of insulin.
Many children die even before their diabetes is diagnosed. Around the world, forces have united to make it come true that no child should die from diabetes or its complications. [9]

Elamin A et al studied during 10 years period clinical pattern of type 1diabetes among children admitted to the department of the university hospital in Khartoum , Sudan .Family history of type 1 diabetes was reported in (4-9%) of patients. Diabetic ketoacidosis was presenting symptom in 82 patient (81.2%) and 93 patients (92.1%) have at least two documented episodes of ketoacidosis during the follow up

period. The average daily dose of insulin by the patient was greater than 2 u/kg body weight and the mean HBA was 13.4%. Seventeen patients (16.8%) were known to have died during years of observation resulting in mortality rate of 42 per 1000 person- years of follow up. The study emphasize the need for urgent measures to increase public awareness of diabetics and to improve methods of case –finding and management of diabetic patients.[10]

1.2 . Problem statement:

Diabetes Mellitus in children is a chronic medical problem, with many complications affecting the growth and development in early and late childhood. Children are now developing type 1 diabetes at an earlier age. The overall incidence of type 1 diabetes in 2010 is predicted to be approximately 40% higher than the incidence recorded in 1997.Evidence has been accumulating that demonstrates a worldwide increase in the incidence of type 1 diabetes mellitus, with incidence rising especially in areas where type 1 diabetes was previously low. Type 1 diabetes is increasing steeply in some central and eastern European countries, where the disease remains less common than in other regions.[11]

If these trends continue, it is inevitable that the total prevalence of people with type 1 diabetes will increase in coming years. Europe is followed closely by South- East Asia, with 23% of the world's young people with type 1 diabetes, and North America and the Caribbean, with 19%. However, the lack of data in other parts of the world makes it difficult to estimate the true burden. In sub-Saharan Africa and many low-resource countries, diagnosis may be missed and children may be dying from a lack of insulin before they are identified. One study in Sudan showed a mortality rate of 42.6 deaths per 100,000 children with type 1 diabetes[10] This is compared to 0.63 deaths per 100,000 children with type 1 diabetes in the USA. [12]

It is almost impossible to determine the true incidence and prevalence in these regions; special efforts must be made to record and report on this problem. Regardless, even in studies from high-income countries, children with type 1 diabetes had at least twice the mortality rate of children without the disease. [13] The prevalence of diabetes mellitus in Sudan dramatically increased from 3.4% in 1996 to 8.05% in 2012 according to IDF (international diabetic federation) and MENA(Middle East and North Africa). With the increasing

of diabetes prevalence, the diabetes related- complications will also increase.

Efficient diabetic care and then subsequent optimal control is difficult for many reasons, health multidisciplinary care centers are only available in two small centers in Khartoum (the capital). There are four private diabetic clinics but the high fees and cost limit their use.

1.3.justifications:

Two large international collaborative projects, the Diabetes Mondialestudy (DiaMond) and the Europe and diabetes study (EURODIAB) have been instrumental in monitoring developments in the incidence of type 1 diabetes in children. According to the latest edition of the Diabetes Atlas , an estimated 490,100 children below the age of 15 years are living with type 1 diabetes.[14]

Incidence of type 1 diabetes varied from 0.1/100,000 per year in China and Venezuela to 36.8/100,000 per year in Sardinia and 36.5/100,000 per year in Finland. This represents a > 350-fold variation in the incidence among the 100 populations worldwide. The global pattern of variation in incidence was evaluated by arbitrarily grouping the populations with a very low (<1/100,000 per year), a low (1–4.99/100,000 per year), an intermediate (5–9.99/100,000 per year), a high (10–19.99/100,000 per year), and a very high (>20/100,000 per year) incidence. The lowest incidence (< 1/100,000 per year) was found in the populations from China and South America. In most populations, the incidence increased with age and was the highest among children 10–14 years of age[16]

The problems of diabetes care in Sudan include the deficiency of diabetes care centers, deficiency of specially trained personnel and diabetes nurse educators and educational material in care settings; however, no traced studies in Sudan examined the effectiveness of education intervention given to the children or their carers , comparing to the prevalence of the disease in Sudan.

- Medical personnel trained in diabetes care, e.g . educators or dietitians, are few , as are diabetes logiest.

-Adequate nurses knowledge about diabetes improves diabetes care and management for diabetic children. .[17]

Objectives

General objective:

To assess the impact of structured teaching program on nurses knowledge regarding type1 diabetes mellitus and insulin management among nurses working in Kosti Teaching Hospital

Specific objectives:

1.To determine the demographic characteristic of nurses dealing with diabetic patients.

2.To assess the basic knowledge of nurses about type 1 diabetes mellitus.

3. To assess the nurse's knowledge and performance regarding insulin administration for type 1 diabetes.

4. To design and implement training program for nurses about insulin administration.

5. To evaluate the effect of designed program on the achievement of nurses knowledge and practice regarding type 1 diabetes and insulin administration post-intervention.

2.Literature review

Diabetes mellitus is a chronic illness, characterized by hyperglycemia resulting from impairment in insulin secretion, defects in insulin action, or both. [18]

Type 1 diabetes is due to autoimmune B -cell destruction, usually leading to absolute insulin deficiency.[19] This results in abnormally high levels of glucose in the blood and widespread disturbances to metabolism. [20]

Type 1 diabetes can develop rapidly and occurs after illness, but symptoms may be mistaken for the flu or other common conditions.

2.1.Causes:

Diabetes type 1 is induced by one or more of the following:-

2.1.1.Genetics:

Type 1 diabetes is polygenic disease , meaning different genes contribute to its onset. Depending on locus or combination of loci , it can be dominant or recessive , or somewhere in between . The strongest gene , IDDMI, is located in the MHCclass11 region on chromosome 6.[21]

The risk of child developing type 1diabetes is about 10 % if the father has it , about 10% if a sibling has it , about 4% if the mother has type 1 diabetes and was aged 25 or younger when the child was born, and about 1% if the mother was over 25 years old when the child was born.[22]

2.1.2.Environment:

Environmental factors can influence expression of type 1 diabetes for identical twins, when one twin had type 1 diabetes , the other twin only had it 30%- 50% of the time. Despite having exactly the same genome, one twin has the disease where the environmental factors in additional to genetic factors , can influence disease prevalence. [22]

2.1.3.Virus :

Type 1 diabetes is a virus – trigger autoimmune response in which the immune system attacks virus – infected cells along with the beta cells in the pancreas. The coxsackie virus family or rubella is implicated , although the evidence is inconclusive. In type 1, pancreatic beta cells in the islets of Langerhans are destroyed decreasing endogenous insulin production, this distinguishes type 1 diabetes origin from type 2. The type of diabetes a patient has is determined only by the cause – fundamentally by whether the patient is insulin resistance (type 2) or insulin deficient without insulin resistance(type 1).This vulnerability is not shared by every one for not everyone infected by the suspected virus develops type 1 diabetes. This has suggested presence of genetic vulnerability[21], and there is indeed an observed inherited tendency to develop type 1. It has been traced to particular HLA genotypes , through the connection between there and triggering of an autoimmune reaction is still poorly understood. [23]

2.2.Pathophysiology:-

The pathophysiology in diabetes type 1 is basically a destruction of beta cells in the pancreas regardless of which risk factors or causative entities have been present. [21]Type 1 diabetes is defined by the presence of one or more of these autoimmune markers. Glutamic acid decarboxylase autoantibodies (GADA),tyrosine phosphatases IA 2 and IA -2b, zinc transporter (ZnT 8) and insulin autoantibodies (IAA). This process occurs in genetically susceptible subjects. Usually progresses over many months or years during which the subject is asymptomatic and hyperglycemic. hyperglycemia develops when 80 %-90 % of β cells are destroyed. The rate of progression is dependent on the age at first detection of antibody, number of antibodies, antibody specificity, and antibody titer. Glucose and HA 1 C levels rise well before the clinical onset of diabetes, making diagnosis feasible well before the onset of diabetic ketoacidosis. [24]

Insulin can be thought of as a compound that opens the doors
to body cells, allowing them to admit the glucose needed to function. It does not play a major role in glucose transport into the brain, erythrocytes, leukocytes, intestinal mucosa, or kidney epithelium. These cells can survive insulin deficiency but not glucose deficiency. If glucose is unable to enter body cells because of a lack of insulin, it builds up in the blood stream (hyperglycemia), and this underlying defect leads to other metabolic consequences. When the kidneys detect hyperglycemia (greater than the renal threshold of about 180 mg/dL, the kidneys attempt to lower it to normal levels by excreting excess glucose into the urine, causing glycosuria. While attempting to excrete this excess glucose, the body also excretes a large amount of fluid (polyuria). Excess fluid loss, in turn, triggers the thirst response (polydipsia) producing the three cardinal symptoms of diabetes: polyuria, polydipsia, and hyperglycemia. Because body cells are unable to use glucose but still need a source of energy, the body breaks down protein and fat for cell utilization. If large amounts of fat are metabolized in this way, weight loss occurs and ketone bodies, the acid end-product of fat breakdown, begin to accumulate in the bloodstream and spill into the urine. Because the blood bicarbonate cannot effectively continue to buffer this high an acid level, the pH of the blood becomes acidic, resulting in severe acidosis.

The breakdown of fat also leads to increased serum cholesterol levels. Potassium and phosphate, attempting to serve as buffers, pass from body cells into the bloodstream. As they are evacuated, the body loses these important electrolytes. Untreated diabetic children, therefore, lose weight, are acidotic , dehydrated, and experience an electrolyte imbalance because of the loss of electrolytes in urine. Because large amounts of protein and fat are being used for energy instead of glucose, these children lack the necessary components for growth; they therefore remain short in stature and underweight. [25]

2.3.Clinical manifestations:

The classic symptoms of Type 1 diabetes are frequent urination, bed wetting in a previously dry child, excessive thirst, excessive tiredness and weight loss.

Children and young people will not necessarily display all symptoms at the same time, and symptoms may vary depending on the age of the child. For example: Bedwetting in a previously "dry" child is the earliest symptom of diabetes occurring in 89% of children over the age of four [26,27]

Weight loss occurs in 50% of children aged 10 -14 years but only in 5% of those under the age of two. Lethargy occurs in 10 - 20% of children of all ages .Constipation occurs in around 10% of children under the age of five and is secondary to chronic dehydration [26] .While oral and vulval thrush has been reported, recurrent infections are uncommon as a presentation, occurring in only 2%. [28] Other symptoms include urinary tract infections and yeast infections ,slow healing or sores, mood swing or irritability , dizziness or fainting.[1,29,30.]

The symptoms are characteristic and the diagnosis is seldom in doubt if hyperglycemia , glycosuria and ketonuria are detected. Young diabetics always require prompt diagnosis and therapy , but the correct diagnosis may be confused by a coincidental febrile illness and the hyperventilation mistakenly interpreted as being due to pneumonia.

Early diagnosis saves lives and allows an organized introduction to the principles of diabetic management; often an out – patient-ketoacidosis obviously necessitates urgent admission. [31]

2.4. Diagnostic tests for diabetes :

Diabetes may be diagnosed based on plasma glucose criteria, either the fasting plasma glucose (FPG) or the 2-h plasma glucose (2-h PG) value during a 75-g oral glucose tolerance test (OGTT), or A1C criteria.

Generally, FPG, 2-h PG during 75-g OGTT, and A1C are equally appropriate for diagnostic testing. [23-32]

Criteria for diagnosis of diabetes:[24-33]

-FPG> 120 mg/dl (11.1)mml/L, fasting is defined as stop caloric intake for at least 8 hours.

- 2 HPG > 200mg/dL(7.0mml/L during OGTT.

The test should be performed as described by WHO , using glucose load containing the equivalent of 75g anhydrous glucose dissolve in water.

-HbA1C.6.55(48mml/L.

-in patient with classic symptoms of hyperglycemia or hyperglycemic crisis, random plasma glucose> 200mg/dL.

Other laboratory tests for known autoantibodies that can indicate an autoimmune attack against the insulin production beta cells of pancreas may be ordered , such as glutamic acid decarboxylase(GAD-65),insulin autoantibodies, and islet cell cytoplasmic autoantibodies.[30] Glycated hemoglobin A1C,HbA1c,A1c, or Hb1c; sometimes also refer to as being Hb1c or HGBA1C) is a form of hemoglobin that is measured primarily to identify the three – months average plasma glucose concentration. The test is limited to a three- months average because the life span of red blood cell is a four month (120 days)- since red blood cells do not all undergo lysis at the same time, HbA1c is taken as limited measure of three months.   It is formed in anon – enzymatic glycation pathway by hemoglobin's exposure to plasma glucose.

HbAc1 is a measure of the beta –N-1-deoxyfructosyle component of hemoglobin. [34] Normal level of glucose produce a normal amount of Glycated Hb. As the average amount of plasma glucose increase , the fraction of Glycated Hb increase in a predictable way. This serve an indicator that blood sugar is increasing and that action should be taken.

In diabetes mellitus , a higher amount of Glycated Hb, indicate poorer control of blood glucose levels , have been associated with cardiovascular disease, nephropathy , neuropathy , and retinopathy.

A-trial on group of patients with type 1 diabetes found that monitoring by care giver of HbAc1 led to change in diabetes treatment and improvement of metabolic control compared to monitoring only of blood or urine glucose. [31]

The A1C has several advantages compared with the FPG and OGTT, including greater convenience (fasting not required), greater pre analytical stability, and less day-to-day perturbations during stress and illness. However, these advantages may be offset by the lower sensitivity of A1C at the designated cut point, greater cost, limited availability of A1C testing in certain regions of the developing world, and the imperfect correlation between A1C and average glucose in certain individuals. National Health and Nutrition Examination Survey (NHANES) data indicate that an A1C cut point of > or equal 6.5% (48 mmol/mol) identifies a prevalence of undiagnosed diabetes that is one-third of that using glucose criteria.[35]

Careful history is necessary to rule out a stress- related illness, corticosteroid use, fracture , acute infection , cystic fibrosis , pancreatitis , or liver disease[25] .

2.5. Management of diabetes mellitus:

Type 1 diabetes is managed by insulin replacement and balancing of diet and exercise in order to maintain glycemic control and prevent   the occurrence of complications.[36.] In order to effectively manage diabetes, education about components of management such as blood glucose monitoring , insulin replacement , diet , exercise , must be delivered to the patients, education is important both at diagnosis , where there is usually no knowledge base and patient and family are given basic skills for controlling the disease. [37]

2.5.1. Nutrition therapy

Weight loss is recommended for all insulin - resistant/overweight or obese individuals. Either   low - carbohydrate, low fat calorie restricted diets. Saturated fat should be < 7 % of total calories.

Monitoring carbohydrate intake by carbohydrate counting, exchanges, or experienced estimation is recommended to achieve glycemic goals.

Routine supplementation with antioxidants, such as vitamins E and C is not advised due to lack of efficacy. [38]

2.5.2.Physical activity

150 minutes/week of moderate intensity exercise (brisk walking) spread over at least 3 days and with no more than 2 days without exercise.

Resistance training of large muscle groups should be ≥ 2 times/week. [39]

2.5.3.Insulin management of diabetes

Insulin is an endogenous hormone, secreted by the beta cells of the pancreas , that enhance the trans-membrane passage of glucose across cell membranes . Insulin lowers the blood glucose level by stimulating glucose passage across cell membranes and uptake into the cells. It also promotes the conversion of glucose to glycogen and inhibits hepatic glucose production from glycogen. It's used as a regular management of type 1 and type 2 diabetes, and for emergency care of diabetic ketoacidosis. Insulin human injection is extracted from beta cells of pork pancreas or synthesized by recombinant DNA technology. [25]

Insulin plays a key role in the regulation of carbohydrate, fat, and protein metabolism. It is a polypeptide hormone of complex structure. There are differences in the amino-acid sequence of animal insulin's, human insulin's and human insulin analogues. Human sequence insulin may be produced semisythetically by enzymatic modification of porcine insulin (emp) or biosynthetically by recombinant DNA technology using bacteria or yeast. [40]

2.5.3.1.Insulin requirement

Most prepubertal children require around 0.6 – 0.8 unit /kg / day of insulin after the initial temporary remission phase. Unless the child leads a very sedentary life- style, a requirement for higher doses my indicate poor compliance or poor absorption of insulin from injection site(e.g. because of

lipohypertrophic sites).During puberty up to 1.5 – 2 units/kg/day of insulin may be required, especially during growth spurts. Around 1 year after menarche or after growth spurt in boys, the dose may need to be adjusted to avoid excessive weight gain. Insulin requirements may be increased by infection, stress, accidental or surgical trauma. Insulin requirement may be decreased in very active individual's and in those with hepatic or renal impairment, some endocrine disorders (e,g. Addison's disease, hypopituitarism) or coeliac disease. Insulin requirement should be assessed frequently in all these circumstances.[40]

2.5.3.2.Types of Insulin

Short acting insulin :-

Is a short – acting form of insulin. For maintenance regimens it is usual to inject it 15 to30 minutes before meals.

Soluble insulin :

Is the most appropriate form of insulin for use in diabetic emergencies and at the time of surgery. It can be given intravenously and intramuscularly , as well as subcutaneously **.** When injected subcutaneously, soluble insulin has a rapid onset of action(30- 60 minutes), a peak action between 2 and 4 hours, and a duration of action of up to 8 hours . When injected intravenously, soluble insulin has a very short half- life of only about 5 minutes and its effect disappears within 30 minutes.

The human insulin analogues:

Insulin asprat and insulin Lispro, have faster onset(10 to 20 minutes) and shorter duration of action(2- 5 hours) than soluble insulin; as a result, compared to soluble insulin, fasting and pre-prandial blood glucose concentration is a little higher, post prandial blood glucose concentration is a little lower, and hypoglycemia occurs slightly less frequently.

-Insulin a sprat **(**recombinant human insulin analogue)

In children under 6 years (use only if benefit likely compared to soluble insulin). Insulin Lispro(recombinant human insulin analogue) , they may be useful in children prone to pre-lunch

hypoglycemia and those who eat late in the evening and are borne to nocturnal hypoglycemia. Insulin a sprat and insulin Lispro may also be administered by subcutaneous infusion.

Neonate 0.01-0.1 units/kg/hour, adjusted according to blood -glucose concentration.

Children 1 month – 18 years 0.025-0.1 units / kg /hour, adjusted according to blood glucose concentration..

Intermediate and long-acting insulin:

When given by subcutaneous injection , intermediate- and long –acting insulin's have an onset of action of approximately 1-2 hours, a maximal effect at 4-12 hours, and a duration of 16 – 35 hours. Some are given twice daily in conjunction with short- acting(soluble) insulin, and others are given once daily. They can mixed with soluble insulin in syringe(except insulin detemir and insulin glargine), essentially retaining the properties of the two components, although there may be some blunting of the initial effect of the soluble insulin component (especially on mixing with protamine zinc insulin). Close monitoring of blood glucose is essential when introducing a change to the insulin regimen; the total daily dose as well as any concomitant treatment may need to be adjusted.

-Isophane insulin:

Is a suspension of insulin with protamine's which is of particular value for initiation of twice- daily insulin regimens . Isophane may be mixed with soluble insulin before injection but ready – mixed preparations may be more appropriate(biphasic Isophane insulin, biphasic insulin a sprat, or biphasic insulin Lispro).

-Insulin zinc suspension (crystalline): Has amore prolonged duration of action ; it may be used independently or in insulin zinc suspension(30% amorphous, 70% crystalline).

-Protamine zinc insulin: Is usually given once daily with- short acting(soluble) insulin. It has the drawback of binding with rapid –acting insulin when mixed in the same syringe and is now rarely used.

-Insulin detemir and insulin glargine: Are human insulin analogues with prolong duration of action; insulin detemir is given once or twice daily and insulin glargine is given once daily. They may help to reduce nocturnal hypoglycemia in those using multiple daily injection regimens.

-Insulin zinc suspension: (insulin zinc suspension(mixed ; I,z,s. – long acting). A sterile neutral suspension of bovine insulin or human insulin in the form of a complex obtained by the addition of suitable zinc salt; consists of rhombohedral crystals(10-40 microns) and of particles of no uniform shape (not exceeding 2 microns.[41]

2.5.3.3.Insulin storage and suspension

Store injectable medication in current use at room temperature(for maximum of one month after initial use) , and with expiry date. Avoid direct sun light and areas of temperature extreme.

Store unopened injectable medication in an area of the refrigerator where freezing is unlikely to occur.[42]

Cloudy insulin (e.g NPH and pre- mixed insulin must be gently rolled ten times and inverted ten times (not shaken) until the crystals go back into suspension and the solution become milky white. [43]

2.5.3.4.Absorption rates

-Human insulin

The abdomen is the preferred site for soluble human insulin , since absorption is fastest there. [44]

Massaging the site before or after injection may speed up absorption and is not recommended.
[44-45-46]

-Premixed insulin

Premixed insulin(human or analogue) should be given in the abdomen in the morning to increase the speed of absorption of short- acting insulin in order to cover post breakfast glycemic excursions. [47]

Rapid- acting analogues should not be give IM , because the risk of sever hypoglycemia or erratic control. [47-48-49]

-Long- acting insulin

Insulin analogues may be given at any of the injection sites, as possible rates do not appear to be site – specific. [44]

Cloudy insulin (e.g NPH and pre- mixed insulin must be gently rolled ten times and inverted ten times (not shaken) until the crystals go back into suspension and the solution become milky white. [49]

2.5.3.5.Needles for injection:

Children and adolescents **:** There is no clinical reasons for recumbently needles longer than 6 mm for children and adolescents.[50]

Children and adolescents using a 5/6 mm needle should lift a skin fold with each injection. [48– 49-50-51]

In the majority of cases 4 mm needle may insert at 90 degree without a lifted skin fold.[51]

If children have only an 8 mm needle available it is essential to use a lifted skin fold or give injections into the buttocks. [51]

2.5.3.6.Injection process

Tips for making injections less painful include:

-Keeping injectable therapy in use , at room temperature. [48]

-Using needles of shorter length and smaller diameter. [48]

Using anew needle at each injection. [45]

2.5.3.7.Insulin injection technique:

-Insulin injection site

The best places to inject insulin are upper arms, the thighs, the buttocks, and the abdomen(at least two inches away from the navel). Because the rate of absorption vary considerably from one body region to another , the American Diabetes Association (ADA) currently recommends rotating injection sites within body regions rather than rotating to a different region with each injection. Insulin absorbed fastest from the abdomen, followed by the arm, the thighs, and the buttocks. (however, exercising an arm or leg after an injection can increase blood flow and speed insulin absorption from those areas) .The ADA recommends taking this variability into account when choosing injection sites. Every one absorbs insulin somewhat differently, so the best

way to find out what effect a given injection site is having is to monitor blood glucose levels. Paying close attention to how rotate injection sites can help to eliminate high and low swings in blood glucose level. [55]

-Injection site care

The site should be inspected and palpated by the individual prior to injection . [45] Avoid using a site showing signs of lipohyprtrophy, inflammation, edema or infection until the problem has been resolved. [56] Injection should be given into a clean site using clean hands. The site should be cleaned with soap and water when found to be unclean . [57] Disinfection of the site is unusually not required; however alcohol swabs may be used prior to injection given in the hospital or care home setting. [51]

-The correct use of syringes

A syringe should be used once and disposed safely. [41-45-46-58-59] Lipohypertrophy it is build -up of fat under the skin, which can slow the absorption of insulin .[55]   Injection Site should be inspected and any abnormalities documented by the health care provider within the individuals care plan. At minimum, each site should be examined annually (preferably at each visit for children).If lipohyprtrophy is already present the site should be monitored at every review. Individual should be taught to examine their own injection sites and how to detect lipohypertrophy. [60] Individual should be advised (and rational explained) not to inject into areas of lipohypertrophy until abnormal tissue return to normal (which can take months to years. [61-62] The best current preventive and therapeutic strategies for lipohypertrophy includes rotation of injection site with each injection, and non-reuse of needles .[61-63-64]

-Rotation of injecting sites:

Individual should be taught an easy – to – follow rotation scheme from the onset of injection therapy . [65] One scheme with proven effectiveness involves dividing the injection site into quadrants (or half when using one thighs or buttocks); using one quadrant per week and moving always in same direction, either clockwise or anti- clockwise. Injecting within any quadrant or half should be spaced at least 1 cm from each other in order to avoid repeat tissue trauma. Health care provider should verify that the rotation scheme is begin followed at each visit and should provide advise where needed ; use a variation of educational approaches and available tools to inform how to detect for lipohyprtrophy. [66]

-Lifted Skin Folds:

All people with diabetes /careers should be taught the correct technique for lifting a skin fold from the onset of injection therapy. The lifted skin fold should not be squeezed so tightly that causes skin blanching or pain.

The optimal sequence should be:-

- lifted skin fold

-Insert needle into skin at 90 degree angle.

-Administer therapy.

-Leave the needle in the skin for at least 10 second after the thumb button plunger is fully depressed.

-Withdraw needle from the skin.

- Release lifted skin fold.

-Dispose of needle safely. [67]

2.5.4.Surgical treatment for type 1 diabetes:

Pancreas and Islet transplantation have been shown to normalize glucose levels but require life-long immunosuppression to prevent graft rejection and recurrence of autoimmune islet destruction. Given the potential adverse effects of immunosuppressive therapy, pancreas transplantation should be reserved for patients with type 1 diabetes undergoing simultaneous renal transplantation, following renal transplantation, or for those with recurrent

ketoacidosis or severe hypoglycemia despite intensive glycemic management.[38]

2.6.Acute complications of type 1 diabetes:

2.6.1.DKA:

Diabetic ketoacidosis is the common and potentially life threating condition that occurs in children with type 1 diabetes when the body must burn fat for energy because no insulin is available to metabolize glucose. DKA is associated with severe metabolic , electrolyte , and fluid imbalances.

The biochemical criteria for the diagnosis of DKA :

Hyperglycemia - blood glucose greater than 250 mg/dL, ketosis -ketones present in blood and/or urine, acidosis pH less than 7.3 and/or bicarbonate less than 15 mmol/L. [68] Potential causes of DKA include incorrect or missed insulin doses or administration just under the skin, an illness , trauma, or surgery. Insulin deficiency is accompanied by a compensatory increase in hormones (epinephrine, norepinephrine , cortisol , growth hormone , and glucagon) which are released when inadequate glucose is delivered to the cells. The muscle cells break down protein into amino acids that are then converted to glucose by the liver, leading to hypoglycemia. The adipose tissue releases fatty acids that are transformed by the liver into ketone bodies. Their accumulation leads to ketoacidosis. The hyperglycemia causes an osmotic diuresis resulting in dehydration , acidosis , and hyper osmolality. Altered consciousness occurs as symptoms progress.

2.6.1.1.Clinical presentation:

Characteristic signs of DKA include dehydration, weight loss , tachycardia, flushed ears and acetone breath, altered level of consciousness, and hypotension. hyperglycemia , glycosuria, and ketonuria are also present . In response to metabolic acidosis , children complain of abdominal or chest pain, nausea , and vomiting. The disorder may progress to electrolyte disturbances, arrhythmias, altered consciousness, shock, and death if untreated. Cerebral edema is a life

threating complication, thought to be related to hyper osmolality. Sign and symptoms include headache, lethargy, tachycardia or bradycardia , and widening pulse pressure. [19]

2.6.1.2.Laboratory diagnosis:

DKA is present with the following findings:

-Blood glucose level greater than 200mg /dL, serum ketones present in blood and / or in urine

-Acidosis (PH less than or equal to 7.3

- Bicarbonate less than 15 mmol/L

- Glycosuria , and ketonuria.[68]

2.6.1.3.Classification of DKA:

DKA is generally categorized by the severity of the acidosis.

Mild :Venous pH less than 7.3 and/or bicarbonate concentration less than 15 mmol/L.

Moderate : Venous pH less than 7.2 and/or bicarbonate concentration less than 10 mmol/L.

Severe : Venous pH less than 7.1 and/or bicarbonate concentration less than 5 mmol/L.

   Electrolyte disorders also occur hyperkalemia, hyperchloremia Hyponatremia, hypophosphatemia, hypocalcaemia , and hypomagnesaemia. The blood urea nitrogen (BUN)and creatinine are elevated due to dehydration. Diabetic coma occurs when the serum osmolality exceeds 350 mOsm /kg. Normal serum osmolality is 275 to 295 mOsm/kg. The child with ketoacidosis is usually hospitalized. Medical management includes intravenous fluids and electrolytes for dehydration acidosis. Regular insulin is given by continuous infusion pump to decrease the serum glucose level at a rate not exceed 100 mg /dL/hr. Faster reduction of hyperglycemia and serum osmolality increase the risk for cerebral edema. Manitol is kept on standby for treatment of neurologic deterioration. Bicarbonate is no longer used for treatment of DKA as it place the child at risk for increased acidosis and hyper osmolality. As insulin is administered , potassium shifts to the cells, resulting in hypokalemia. Potassium supplementation is given only after confirmation of renal

function. Cerebral edema occurs in about 3 % of children with DKA , but is accounts for 30% of DKA death and 20 % of overall childhood mortality. [25]

The risk for morbidity and mortality is higher in severe DKA. These patients require close physician monitoring, frequently utilizing central venous and intra-arterial pressure monitoring as well as frequent blood chemistry determinations to direct therapy. Physicians experienced in the care of children with DKA (pediatric endocrinologists or pediatric intensivists) should direct management, whenever possible. [69]

2.6.1.4.Nursing management:

Continuously monitor the child's vital signs , respiratory status , and perfusion, and mental status. Assess for changes in neurologic status, respiratory pattern, blood pressure, and heart rate. Attach a cardiac monitor and observe for arrhythmias associated with hypokalemia. Frequently monitoring the electrolytes and acid- base status, the blood glucose levels , and the urine ketone levels . Monitor intake and output and assess for dehydration. Give intravenous fluids in boluses of 10 to 20 ml/kg rapidly over 5 minutes if the child is in shock .Replace electrolytes as needed . The insulin infusion must be carefully maintained to control the gradual reduction in hyperglycemia. When the child off intravenous insulin and transition to subcutaneous insulin and clinically stable , oral feeding is introduced when the child is alert and the glucose level is stabilized.

2.6.1.5.Nursing practice:

Insulin binds IV tubing , let 50 to 100 ml run through IV tubing to saturate all the binding sites. This ensures that full dose of insulin reaches the child from the outset. The prevention of future episodes of DKA is important. The parents and child need to learn strategies to keep hyperglycemic episodes from progressing to DKA. For example the child's urine should be tested for ketones if three or four consecutive blood glucose reading are higher than 200 mg/dL, or if the child is sick. If the child has a high blood

glucose and moderate or large amounts of ketones, treatment with extra insulin and fluids can be initiated. [19]

2.6.2.Hypoglycemia:

The desire to avoid hypoglycemia is one of the major barriers to achieving near-normal glycemic control. [70] Hypoglycemia is the major limiting factor in the glycemic management of type 1 and type 2 diabetes. [71]

2.6.2.1.Classsification of hypoglycemia:

Classification of hypoglycemia. [72]

international hypoglycemia study group . glucose concentration of less than3.0 mmol/L should be reported

Level (level 1) :

Hypoglycemia alert value.

Glycemic Criteria: <70 mg /dl(3mmol)

Description   :Sufficiently low for treatment with fast-acting glucose –lowering therapy.

-**level (2):** Clinical significant hypoglycemia.

Glycemic criteria:< 45mg/ dl(3.mmol/L).

Description: Sufficiently low to indicate serious clinically improve hypoglycemia.

Level (3): Severe hypoglycemia.

Glycemic criteria: No specific glucose threshold.

Description: Hypoglycemia associated with sever cognitive impairment requiring external assistance for recovery.

Hypoglycemia is classified according to the International Hypoglycemia Study Group. The classification scheme considers a   blood glucose , >54 mg/dL (3.0 mmol/L) detected by SMBG, CGM (for at least 20 min), or laboratory measurement of plasma glucose as sufficiently low to indicate serious, clinically significant hypoglycemia that should be included in reports of clinical trials of glucose-lowering drugs for the treatment of diabetes. [72]

However, a glucose alert value of >70 mg/dL (3.9 mmol/L) can be important for therapeutic dose adjustment of glucose-lowering drugs in clinical care and is often related to symptomatic hypoglycemia. Severe hypoglycemia is defined

as severe cognitive impairment requiring assistance from another person for recovery. [73]

2.6.2.2. Clinical presentation:

Symptoms of hypoglycemia include, but are not limited to, shakiness, irritability, confusion, tachycardia, and hunger. Hypoglycemia may be inconvenient or frightening to patients with diabetes. Severe hypoglycemia may be recognized or unrecognized and can progress to loss of consciousness, seizure, coma, or death. It is reversed by administration of rapid-acting glucose or glucagon. Clinically significant hypoglycemia can cause acute harm to the person with diabetes or others, especially if it causes falls, motor vehicle accidents, or other injury. A large cohort study suggested that among older adults with type 2 diabetes, a history of severe hypoglycemia was associated with greater risk of dementia. [74].

Evidence from DCCT/EDIC, which involved adolescents and younger adults with type 1 diabetes, found no association between frequency of severe hypoglycemia and cognitive decline. [75]

 With mortality in participants in both the standard and the intensive glycaemia arms of the ACCORD trial, but the relationships between hypoglycemia, achieved A1C,and treatment intensity were not straight for- ward. An association of severe hypoglycemia with mortality was also found in the ADVANCE trial. [76] An association between self-reported severe hypoglycemia and 5-year mortality has also been reported in clinical practice. [77]

Young children with type 1 diabetes and the elderly are noted as particularly vulnerable to clinically significant hypoglycemia because of their reduced ability to recognize hypoglycemic symptoms and effectively communicate their needs. Individualized glucose targets, patient education, dietary intervention(e.g. bedtime snack to prevent overnight hypoglycemia), exercise management, medication adjustment, glucose monitoring, and routine clinical surveillance may improve patient outcomes. [78].

In 2015, the ADA changed its pre -prandial glycemic target from 70

130 mg/dL (3.9 – 7.2 mmol/L) to 80 – 130 mg/dL (4.4 – 7.2 mmol/L). This change reflects the results of the ADAG study, which demonstrated that higher glycemic targets corresponded

to A1C goals [71]. An additional goal of raising the lower range of the glycemic target was to limit overtreatment and provide a safety margin in patients titrating glucose-lowering drugs such as insulin to glycemic targets.

2.6.2.3.Hypoglycemia treatment:

   Providers should continue to counsel patients to treat hypoglycemia with fast-acting carbohydrates at the blood glucose alert value of 70 mg/dL (3.9 mmol/L) or less.

 Hypoglycemia treatment requires ingestion of glucose-or carbohydrate-containing foods. Glucose (15 – 20 g) is the preferred   treatment for the conscious individual with hypoglycemia (glucose alert value of ≤ 70 mg/dL), Fifteen minutes   after   treatment,   if   BG   shows   continued hypoglycemia, the treatment should be repeated. Once BG returns to normal, the individual should consume a meal or snack to prevent recurrence of hypoglycemia. Injectable glucagon   should   be   prescribed   for   all   individuals   at increased risk of clinically significant hypoglycemia.[79] The acute glycemic response correlates better with the glucose content of food than with the carbohydrate content of food. Pure glucose is the preferred treatment, but any form of carbohydrate that contains glucose will raise blood glucose. Added fat may retard and then prolong the acute glycemic response. Ongoing insulin activity or insulin secretagogues may lead to recurrent hypoglycemia unless further food is ingested after recovery. Once the glucose returns to normal, the individual should be counseled to eat a meal or snack to prevent recurrent hypoglycemia . The use of glucagon is indicated for the treatment of hypoglycemia in people un-able or unwilling to consume carbohydrates by mouth. Those

in close contact with, or having custodial care of, people with hypoglycemia-prone diabetes (family members, roommates, school personnel, child care providers, correctional institution staff, or coworkers) should be instructed on the use of glucagon kits including where the kit is and when and how to administer glucagon. An individual does not need to be a health care professional to safely administer glucagon. Care should be taken to ensure that glucagon kits are not expired.

2.6.2.4.Nursing management:
Nursing assessment and diagnosis:
 Physiological assessment:
   Children are generally admitted to the hospital at the time of diagnosis . assess the child physiological status , focusing on vital signs and level of consciousness. Assess hydration by checking mucous membranes, skin turgor and urine output . Blood initially is collected hourly to monitor blood gases, glucose and electrolytes. Once the child is stable, assess dietary and caloric intake and the ability of the child or family to manage care.

2.7.Education process and support:
   Support for commencement of an injectable therapy Initiation of injectable medicines can be overwhelming for many people. People with type 1 diabetes, including children, adolescents and adults, will be required to commence insulin at the time of diagnosis. [80]People of any age can struggle with injections and may require support and assistance to develop the skills required for improved diabetes management. Others may need support on an ongoing basis to achieve the required glycaemic management. Recommendations to support the education process include:
-Distraction techniques or play therapy for children (e.g. injecting into a stuffed animal).
-Cognitive behavior therapy techniques for older children (e.g. guided imagery, incentive scheduling).

-Health care professionals or parents/careers demonstrating and self-injecting saline to help alleviate anxiety.

-Always using positive language to discuss injection of diabetes medicines.

-Allowing the person with diabetes to be open and honest regarding their feelings and emotions towards injections, including their frustrations and struggles.[81]

- Understanding that children have a lower pain threshold than adults, and therefore asking questions regarding pain at each diabetes education review.

-Referral to a psychologist for input if the person with diabetes has significant fear around injections.

-Where other careers are involved in the administration of insulin, their involvement in the education process is essential. They should be offered the same education as the person with diabetes and this also requires documentation. Examples of those who may be involved in the administration of an injectable medicine include family (spouse, children, partners),health care professionals (diabetes educators, general practitioners, practice nurses, domiciliary nurses and community care workers. [81]

-Structured self-blood glucose monitoring, including appropriate frequency and timing in relation to injection regimen and documentation in a diary/logbook or meter download.

-Hypo glycaemia, including symptoms, prevention and treatment.

Where required, discussion of the considerations for flying and travelling when taking injectable medicines. [81]

2.8.Education about insulin(key topics):

Research has shown that people with diabetes do not always receive education about the injection of diabetes medications, and when they do, not all essential topics are covered.[82-83]

In (2008-2009) insulin Injection Technique Questionnaire survey, 25% of participants reported wanting more education regarding Injection Technique. [83 While there was some

variation between countries, many participants did not recall a number of key topics being adequately covered during their education and training. [83] Raz I, et al (In 2009) revealed almost 70% of nurses were wanting to learn more about insulin injection technique. Education in correct injection technique should cover the following essential topics. [80] :

-The injection regimen including the timing and action of prescribed medicines and dose(s) required.

-The choice, and training in use of insulin pen device and/or syringe Assembly of the device including loading of insulin cartridge if applicable - Preparation of the device for injection, including attaching pen needle and priming - Drawing up of insulin for syringes .Choice of injection site(s) and importance of site rotation. Note that different sites can illicit different rates of insulin absorption.

-The importance of single use of needles and syringes ,including angle of injection and use of a lifted skin fold, where required.

-Injection complications and how to avoid these.

-Storage of injectable medicines according to the manufacturers' instructions.

-Safe disposal of sharps.

-Preparation of skin prior to injecting. Hands should be washed prior to preparing the device and injecting.

3.Materials and Methods

3.1. Study design:

This is an interventional Quasi hospital- based study including preprogram and post program.

3. 2. study area / setting:

This study was conducted in kosti teaching hospital, White Nile State.

White Nile state has an area of 30,411 km² & an estimated population of approximately 1.188.707(2006).Since 1994 Rabak is the capital of the state . Other important cities include kosti & Elduiem. [84] The state lies between longitudes 33.5 to35 E &latitudes 17 to 19 N. It is surrounded by Khartoum state in the north- east , in the north – west by the Gazera and Sinar states, in the south by the south Sudan country & in the west by north Kordufan.[85]

Kosti is one of the major cities (population in 1993 was estimated173-549). Kosti teaching hospital is the largest governmental hospital in white Nile state .It was established since 1942 and became teaching hospital in 1993 .Hospital capacity about 427 beds in 9 departments & there are three other departments which was separated and become a hospital e.g. obstetric & gynecological hospital, ophthalmological hospital & renal hospital .The study was done in emergency department , pediatric ward, pediatric casualty , medical ward (male& female), surgical wards (male & female) ,intensive care unit and theater .The total graduated employed nurses were 63 .

3.3.Study duration:

2013-2018.

3.4.Study population:-

Qualified employed nursing staff working in the hospital during the study period.

3.4.1. Inclusion criteria:

-Nurses with qualification for at least three years

- Nurses with permanent job

-Nurses who attend the educational program

- Nurses working in Kosti teaching hospital

3.4.2. Exclusion criteria:
-Nurses who refused to participate in the study
-Nurses who did not fully complete the program till the evaluation phase.

3.5.Sample selection and sample size:
A total convenient sample of all available employed nurses (63) who met
the inclusion criteria were included in the study.

3.6.Variables under study:
3.6.1.Nurses knowledge:
3.6.1.1. Nurse's knowledge regarding Type 1 diabetes mellitus:
Etiology of diabetes mellitus
Distinguish type 1 diabetes from type 2
Laboratory diagnosis of diabetes
Management of type 1 diabetes mellitus
Treatment of hypoglyceania
Hyperglycemia
Diagnostic test to assess long term control
Normal range of HAb1c
Targeted blood glucose when treating hypoglycemia
3.6.1.2. Nurses knowledge about insulin:
Insulin sensitivity in type 1 diabetes
Storage of open insulin vial
Dividing area of injecting insulin
Peak action of soluble insulin
Position of needle when injecting insulin
Rotating mixed insulin vial
Fast area of insulin absorption

Space between injection sites

Inject in lipohyprtrophyied

Rotation area of injection.

3.6.2.Nurses' Practice:

3.6.2.1.Insulin preparation :

1- Wash hands

2- Gather supplies(insulin-syringe- insulin ,gloves , cotton ball, alcohol wipe)

3- Check 6th rights of medication administration:

Right patient

Right time

Right medication

Right rout

Right dose

Right documentation

4- check insulin expiration and appearance, clear or color

5- clean rubber stopper with alcohol

6- pull plunger back to pull air into syringe until the tip of plunger is at the line for the number of units required for the dose

7- push the needle through the rubber stopper- making sure the tip of the needle is not in the insulin

8- press the plunger to push air into the vial of insulin

9- turn the vial and syringe upside down so that the top of the needle is in the insulin

10- holding the vial with one hand, pull back the plunger to pull insulin into the syringe until has reach the line of the proper dose

3.6.2.2.Insulin injection technique:

1.The lifted skin fold

2.Insert needle into skin at 90 degree angle

3.Administer therapy

4. Leave the needle in the skin for at least 10 second after the thumb button plunger is fully depressed.

5. Withdraw needle from the skin.

6. Release lifted skin fold.

7. Massaging the site after injection.

3.7.Data collection tools:

Tools 1 : structured questionnaire which consist of three parts :

    Part one: Questions about demographic data of the study populations .It consists of information about age, sex, education level, working area , years of experience and attending of training courses about type 1diabetes mellitus.

    Part two: Questions about general knowledge about type 1 diabetes mellitus.

    Part three: Questions about general knowledge about insulin:

Tool 2 : observational checklist

This tool was developed in order to assess nurse's performance during the clinical practice there were 10 items about general concepts in insulin preparation and 7 items about administration and technique of insulin injection.

3.8.Scoring system

  3.8.1. Scoring for knowledge :

  Scoring of knowledge using the following:

     -Score of 0-1 point classified as poor knowledge .

    - Score of 2 points classified as satisfied knowledge.

    - Score of 3-4 points classified as good knowledge .

3.8.2. Scoring for performance:

  3.8.2.1.insulin preparation technique:

Insulin preparation technique consist of 10 steps of total score 10 points:

- Score of (0-4) classified as poor performance.
- Score of (5-7) classified as fair performance
- Score of (8-10) classified as good performance

  3.8.2.2.insulin injection technique:

Insulin injection technique consist of 7 steps of total score 7 points:

- Score of (0-3) classified as poor performance.
- Score of (4-5) classified as fair performance
- Score of (6-7) classified as good performance

3.9.Validity and reliability:

The tools was reviewed by experts in the field of study to test validity A pilot study was carried out on 7 nurses working in Rabak teaching hospital before embarking on the actual study(data collection).

3.10. Data collection technique:

The study was done in three phases:

3.10.1.Phase 1 (Pre- interventional phase) :

In this phase the designed questionnaire was filled by the study population and their practice regarding insulin was tested using the check list. Questionnaire was filled in their rest time and at rest room. The time required to fill the questionnaire was about 10 - 15 minutes

3.10.2.Interventional phase (Educational program) phase two :

In this phase the educational program regarding type 1 diabetes and insulin administration was applied. The nurses were divided into four number groups. The education was in the form of lectures ,each lecture took about 2 Hours. The injection technique was demonstrated using models. This interventional phase took 6 months. Orientation to the educational program format, including: the lecture's time, and the   educational materials. Each lecture time was one and half hour, and there was about half hour time offered for discussion after each lecture for further clarification about what is missing or not understood by the participants. An intense educational program had been designed by the researcher to raise nurses knowledge about type 1 diabetes and insulin preparation ,administration and technique of injection in the light of the   available researches and literature. The intervention had been developed in Arabic language to cover the   relevant theoretical and practical aspects of knowledge about type 1 diabetes   insulin preparation and   administration technique of injection. Different teaching methods as discussion, demonstration ,re-demonstration and supervised practice have been used.

The researcher used audiovisual aids and instructional videos to provide knowledge and technique of insulin administration. The intervention had been implemented to nurses in four groups (group1 contain 15nurses , group2 contain 15 nurses ,group three consist of 15 nurses and group four contains 18 nurses(were divided into small group during demonstration and re - demonstration). The program had been implemented in two sessions per day (four days per week for each group) for four weeks for theoretical and practical sites . Each session had taken about two hours and at the end of each session each nurse has been assessed for his/her understanding of the instructions. The impact of the program was based on the improvement of the nurses knowledge about diabetes mellitus and practice about insulin preparation , administration and technique of injection.

3.10.3. Phase three (**Evaluation phase**):
The same tools used in phase 1 were repeated to evaluate the effect of the educational program.
Evaluation of the educational program through post- tests :
 Post- test(1): was carried out one month after implementing the educational program .
 Post- test (2): was carried out after two months from the post- test one.
 After analysis of data the researcher had explanation of the incorrect items, and the nurses were thanked for participating in the study .

3.11.Data entry and statistical analysis:
 Statistical Package for Social Science (SPSS) version 20 was used for data entry. Tests used for analysis were chi^2 and T.test. Confidence level was 95%.

3.12.Ethical consideration:
 Official letter from the faculty of graduate studies was delivered to the responsible authorities of hospital to take their approval to conduct this study. It was obtained after explaining the purpose of the study. Nurses formal agreement to participate in the study was obtained after

explanation of the study purpose. Each nurse was reassured that confidentiality and privacy will be maintained and his or her right to withdraw at any time.

3.13.Difficulties:

Collection of nurses for educational program during working hours take longer time.

4.Results

Table 1: Characteristics of the study group (age, , duration of work, attendance of course in diabetic care, area of working)

Age	Frequency	Percentage
20-30 years	23	36.5%
31-40 years	28	44.5%
41-50 years	6	9.5%
More than 50 years	6	9.5%
Total	63	100.0%
Duration of work		
Less than 5years	24	38.1%
6-10 years	11	17.5%
11-20 years	20	31.7%
More than 20 years	8	12.7%
Total	63	100.0%
Attendance of course in diabetic care		
Attended	8	12.7%
Not attended	55	87.3%
Total	63	100%
Area of work		
Pediatric ward	12	19.0%
Medicine ward	22	34.9%
Surgery ward	15	23.8%
Casualty	14	22.3%
Total	63	100.0%

N:63

1. Demographic information's:

4.1. Demographic characteristics of the study group:

The table showed that (36.5%) of studied group ages range between (20-30) years, (44.5%) between (31-40) years,(9,5%) between(41-50) years and (9.5%) above 50 years. Regarding duration of work (38.1%) working for less than 5 years, and (12.7%) for more than 20 years . Also this table illustrated that (87.5%) of studied group didn't attend a course in diabetes mellitus care .About area of working, (19%) work in pediatric ward, (34.9%) in medicine ward, (23.8%) in surgery ward and (22.2%) in the casualty.
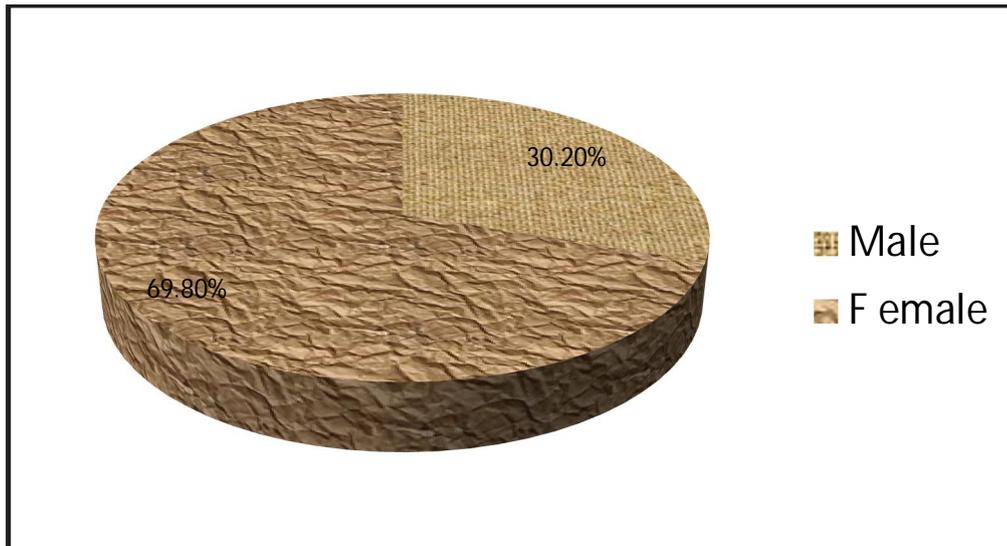
N:63

Figure (1): Showed gender of study group with female predominance(69.8%).

degree of graduation	diploma	bachalareo	master
	82.50%	15.90%	1.50%
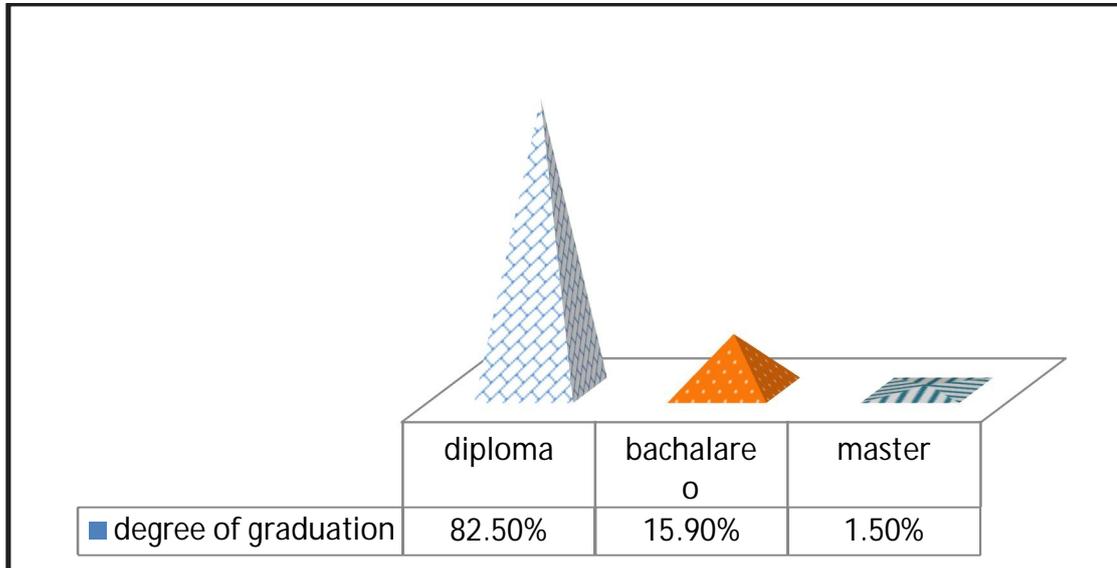
N:63

Figure (2): Illustrated nurse's degree of graduation. Majority (82.5 %) had diploma while only (1.5%) had master degree.
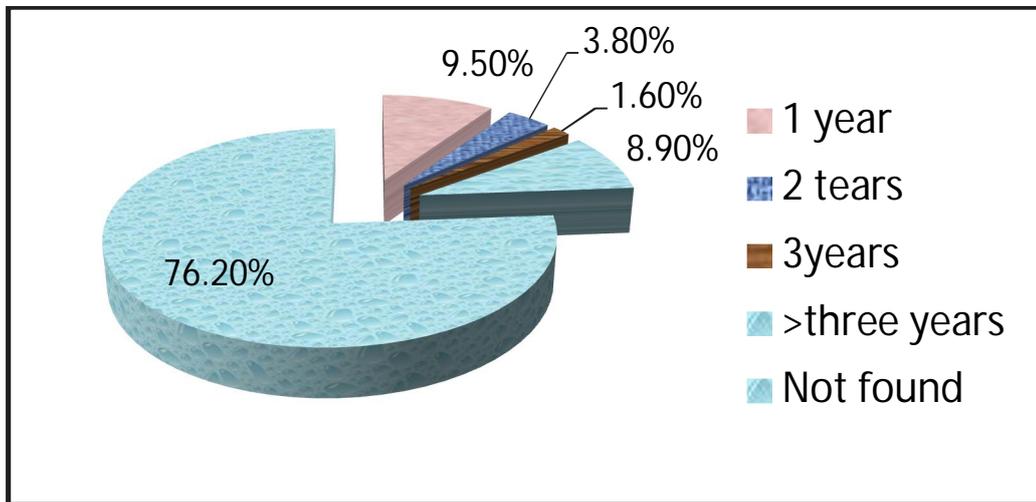
N:63

Figure (3): Clarified years of experience in diabetic care, (76.2%) of study group had no experience in diabetic care and (9.5%) had experience more than three years.

2- Nurses knowledge about diabetes mellitus:

Table 2: Nurse's knowledge about etiology for type 1 diabetes mellitus.

Etiology	Pre –Test		Post-tset1		Post-test2	
	F	%	F	%	F	%
Poor	38	60.3%	13	20.6%	5	8%
Fair	19	30.2%	8	12.7%	6	9.5 %
Good	6	9.5%	42	66.7%	52	82.5 %
Total	63	100%	63	100	63	100

P. value 0.000

N:63

The table clarified the knowledge of nurses regarding etiology of type 1 diabetes .Only (9.5%) had good knowledge pre- test, and (60%) had poor knowledge. Whereas the good knowledge was increased after applying the program to (66.7%) in post-test 1and to (82.5%) in post-test2.There was high statistical significant relation (P. value 0.000).
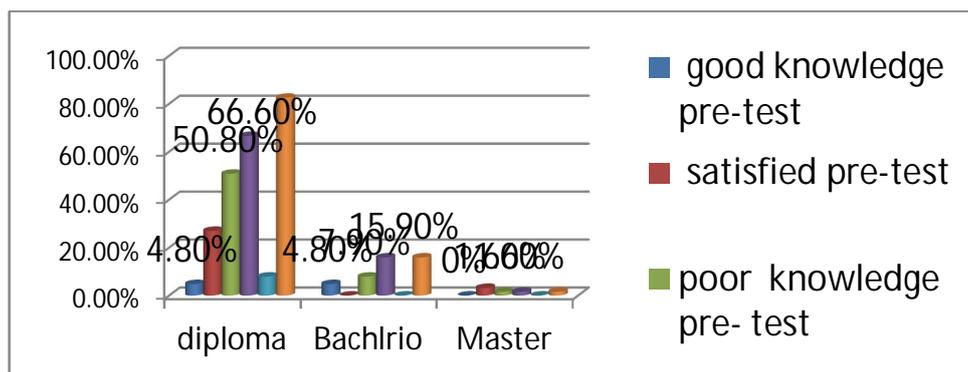
P value:0.004

N:63

Figure (4): Illustrated that there was statistical relation between nurses degree of graduation and Knowledge

regarding etiology of type 1 diabetes. P value was.004 in posttest 2

Table 3: Nurse's knowledge about distinguishing type 1 from type 2 diabetes

Distinguishir from type 2	Pre- test		Post-test1		Post-test2	
	F	%	F	%	F	%
Poor	25	39.7%	8	12.7%	7	10.9%
Fair	26	41.3%	14	22.2%	5	9.4%
Good	12	19.0%	41	65.1%	51	79.7%
Total	63	100%	63	100	63	100

P. value 0.02

N:63

The table clarified the knowledge of nurses regarding distinguishing between type 1 and type 2diabetes. Only (19.0 %) had good knowledge pre- test**,** while (41.3%) had fair knowledge .The good knowledge was increased to (65.1%) in post-test 1and to (79.7%) in post-test2**.**There was statistical significance (P. value 0.02).

Table 4: Nurse's knowledge about laboratory diagnosis of type 1 diabetes

Knowledge about laboratory diagnosis of diabetes	Pre test		Post-test		Post-test2	
	F	%	F	%	F	%
Poor	19	30.2%	10	15.9%	8	12.7%
Fair	30	47.6%	15	23.8%	10	15.9%
Good	14	22.2%	38	60.3%	45	71.4%
Total	63	100%	63	100	63	100

P. value: 0.7
N:63

The table illustrated nurse's knowledge regarding the laboratory diagnosis of type1 diabetes .In pre- test, post- test 1 & post -test 2 the fair knowledge was (47.6 %) , (23.8%) and (15.9%) respectively. Whereas the good knowledge had increased from (22.2%) in pretest to (71.4%) in post-test 2.
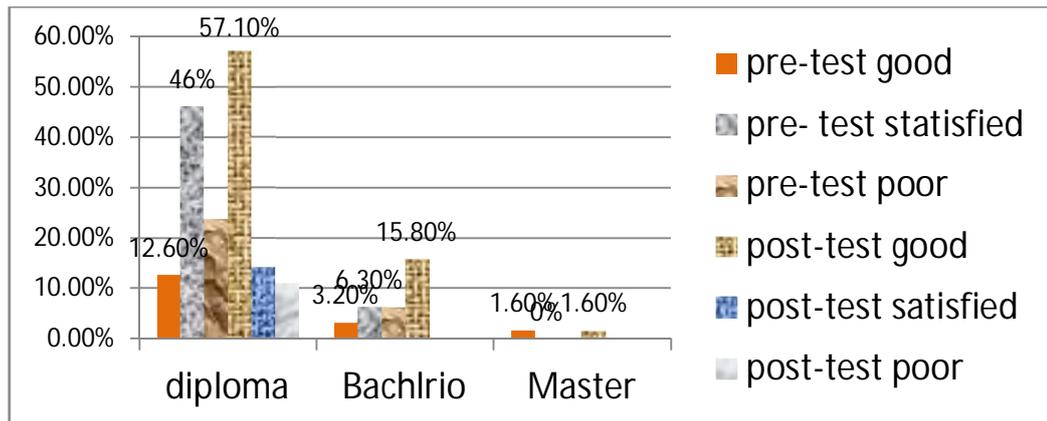
P value: 0.038

N:63

Figure (5) : Illustrated that was statistical relation between nurse's degree of graduation and knowledge about laboratory diagnosis of diabetes in post-test 2.Pvalue was 0.038

Table 5: Nurse's knowledge about treatment of type 1 diabetes.

Treatment of type1 diabetes	Pre test		Post- test 1		Post- test2	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Poor	35	55.5%%	15	23.8%	9	14.3%
Fair	19	30.2%	7	11.1%	4	6.3%
Good	9	14.3%	41	65.1%	50	79.4%
Total	63	100%	63	100	63	100

P. value 0.03

N:63

The table clarified the knowledge of nurses regarding treatment of type1diabetes. Only (14.3 %) had good knowledge while (55.5%) had poor knowledge in pre-test. The poor knowledge was decreased in post-test 1 and post-test 2 to (23.8%) and

(14.3%) respectively. There was statistical significant relation between pre-test, post-tes1 and post-test2 (P. value 0.03).
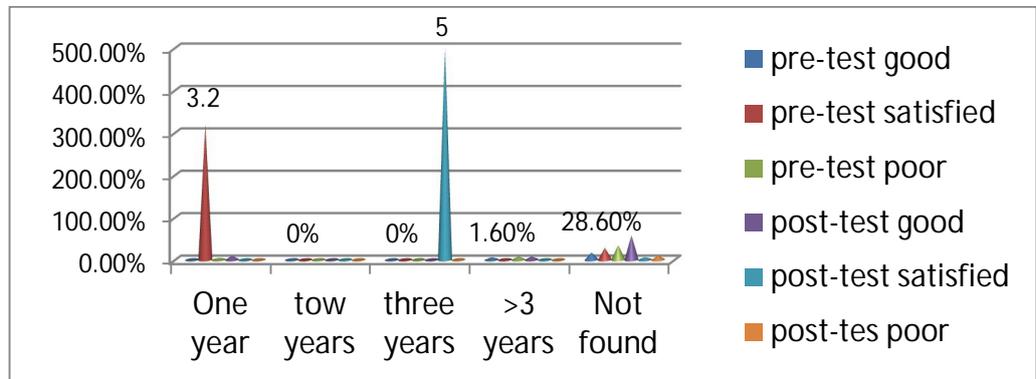
N:63
P value :0.000

Figure (6): Illustrated that there was relation between nurses years of experience and knowledge about treatment of type 1 diabetes mellitus .P value was 0.036 in post-test 2.

Table 6: Nurse's knowledge about initial intervention in hypoglycemia(blood glucose <70 mg/dl.

Nurses intervention	Pre- test		Post- test 1		Post- test2	
	F	%	F	%	F	%
Wait For Doctor Order	17	26.9%	13	20.6%	15	23.8%
Notify Doctor	37	58.7%	18	28.6%	10	15.9%
Give Patient Sweaty Drink	9	14.4%	32	50.8%	38	60.3%
Total	63	100%	63	100%	63	100%

P value: 0.004
N:63

The table showed the knowledge of nurses regarding their action in case of hypoglycemia, only (14.4%) their response is giving the patient sweaty drinks while (26.9%) wait for the doctor and (58.7%) notify the doctor in pre-test .Those responding by giving sweaty drinks were increased to (59.4%) in post-test2 (P. value .0.004).
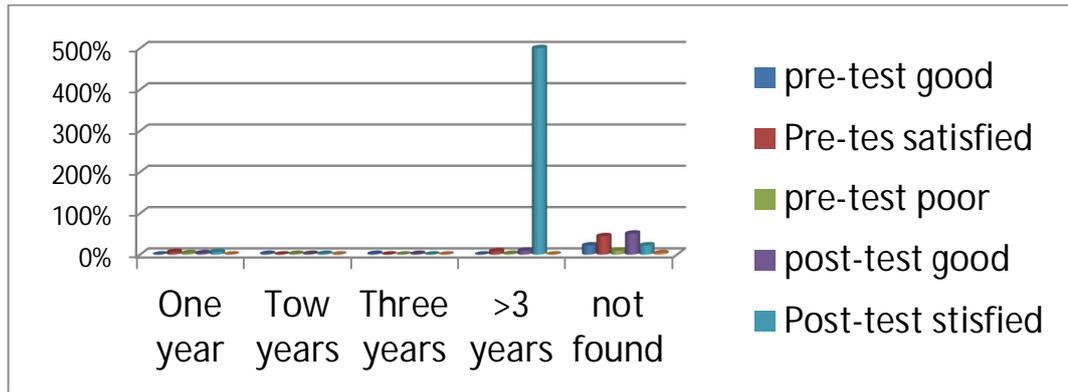
Figure (7): Showed that there was statistical relation between nurses years of experience and knowledge about action when blood treating hypoglycemia. P value was .042 in posttest 2.
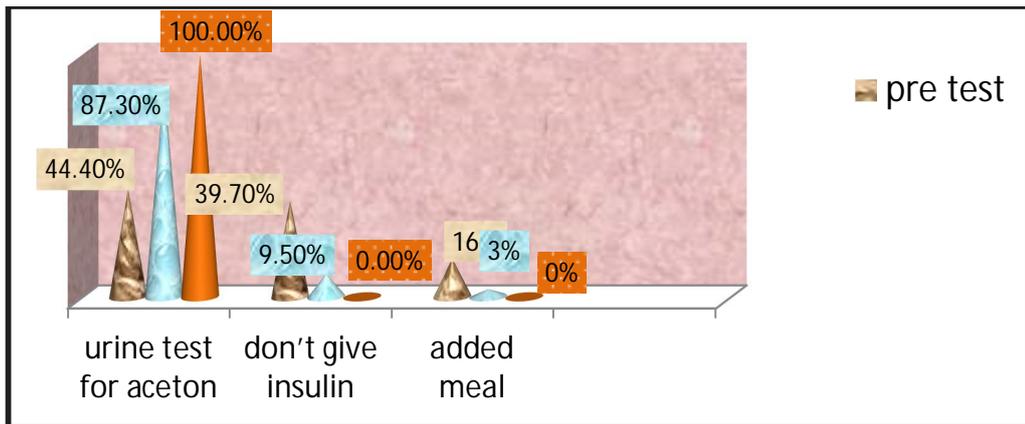
Figure (8) :Showed that (44.4 %) of nurses their action when blood glucose reach 300 mg is testing urine for acetone,(39.7%) their action they didn't give patient insulin in pre-test, where as the result of urine test for acetone was increased after implementing program to(87.3%)in post-test1 and (100%) in post-test2) respectively.
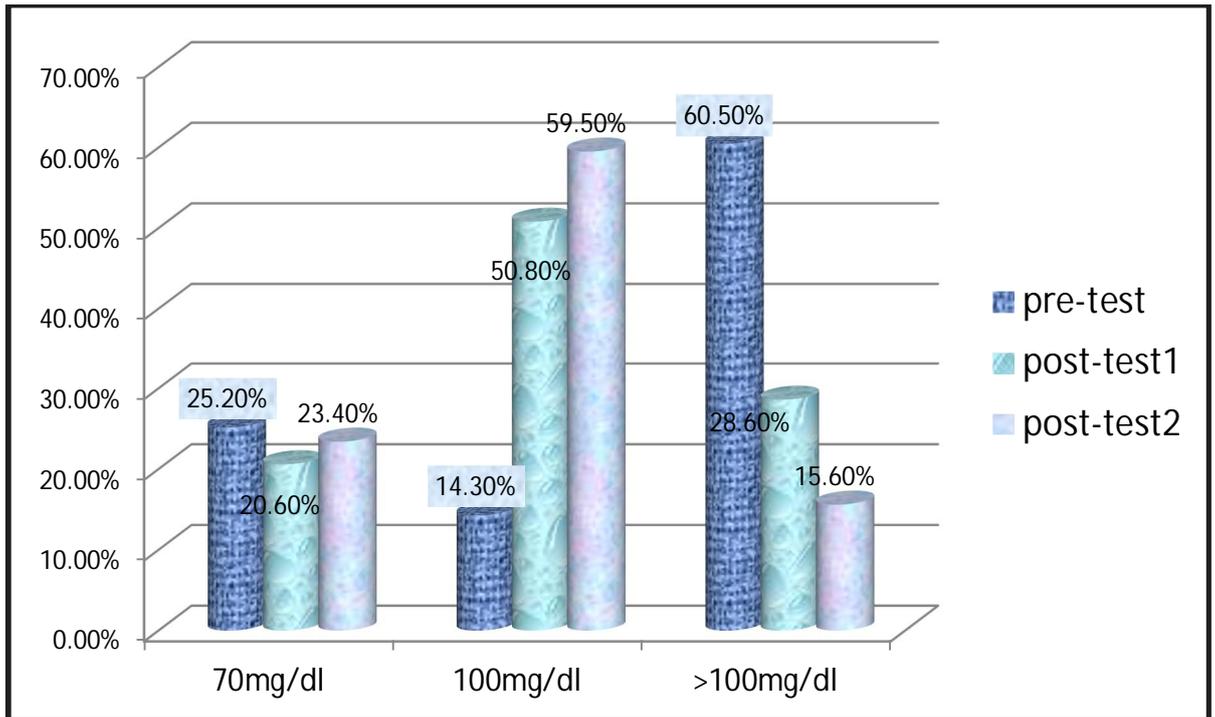
P value: 0.008
N:63

Figure (9) :Illustrated that (14.3 %) of nurses thought that the glucose level when treating hypoglycemia should reach 100 mg/dl in pretest, while in posttest 1 and 2 increased to (50.8%) and (59.4%) respectively.

Table 7: Nurse's knowledge regarding the test used to identify diabetic control during last 3-4 months and normal range of HbAC1.

Knowledge regarding the test used	Pre- test		Post- test 1		Post- test2		P. value
	F	%	F	%	F	%	
Poor	23	36.5 %	19	30.2 %	9	14.3 %	0.000
Satisfied	34	54%	12	19%	10	15.9 %	
Good	6	9.5%	32	50.8 %	44	69.8 %	
Total	63	100%	63	100	63	100 %	
knowledge regarding normal range of HbAC1	Pre- test		Post- test 1		Post- test2		P. value 0.000
6-6.5%	31	49.2%	20	31.7%	12	19%	
6 .6- 7 %	22	34.9%	22	34.9%	19	30.2 %	
>7 %	10	15.9%	21	33.3%	32	50.8 %	
Total	63	100%	63	100	63	100	

N:63

The table clarified that only (9.5%) of studied group had good knowledge about the test used to assess diabetic control during the last 2-3 months ,(54%) had satisfied knowledge and (36.5%) had poor knowledge , whereas the knowledge was increased in post-test 1 to (50.8%) & (69.8) post-test. Regarding normal range of HbA C1, there was (15.9%) had good knowledge and(34.9%) had satisfied knowledge ,whereas still less than half of studied group had good

knowledge after implementation of program to(33.3%) post-test1 and (50.8%) post-test2, P Value was 0.000

3. Nurses knowledge about insulin:

P value 0.008
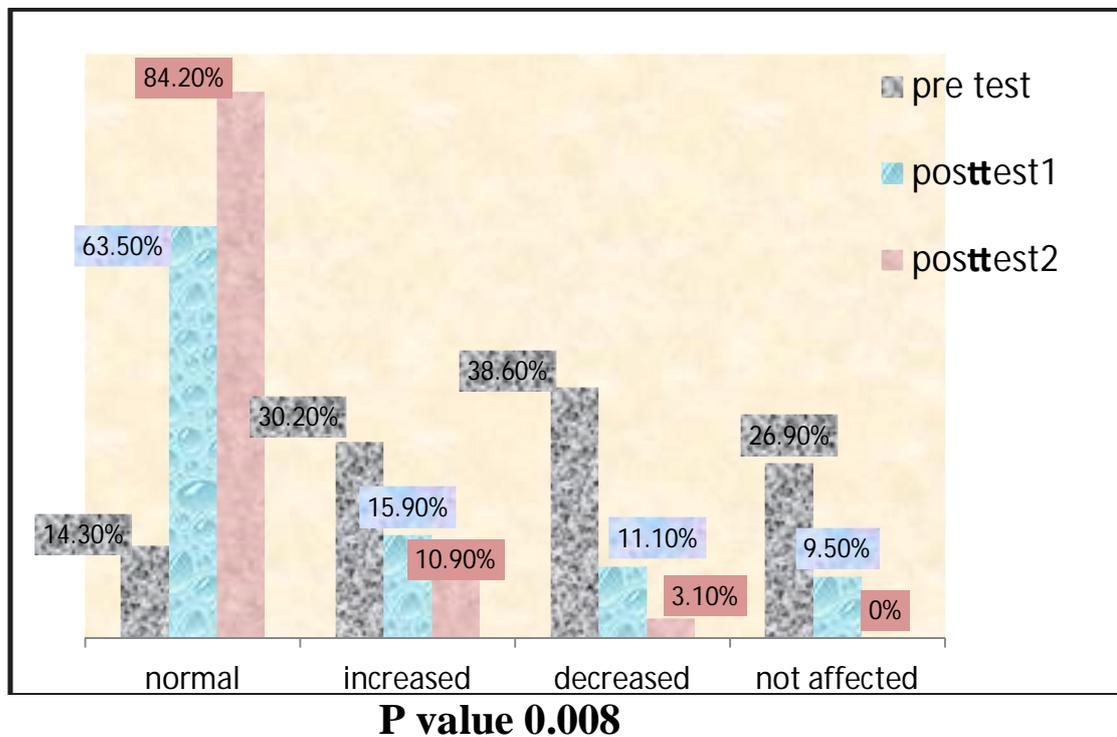
N:63

Figure (10):Clarify that only (14.3 %) of nurses they had a good knowledge about insulin sensitivity in type 1 diabetes (26.9%) had poor knowledge and(58.7%) had fair knowledge , while this result increased after application of program to (40%) in post-test 1 and (84.4%) in post-test2.

Table 8: Nurse's knowledge regarding potency of opened insulin vial

Knowledge about potency of opened insulin vial	Pre test		Post- test 1		Post- test2	
	F	%	F	%	F	%
Three weeks	18	28.6%	4	6.3%	7	11.1%
One month	11	17.4%	43	68.3%	51	80.9%
3 months	34	54%	16	25.4%	5	7.9%
Total	63	100%	63	100	63	100

P. value: 0.03
N:63

The table clarified the knowledge of nurses   regarding potency of opened insulin vial, there was good knowledge in only (17.4 %) pre- test, which was increased after applying the program to(68.3%) in post-test 1and(80.9%) in post-test2 ,(P .Value 0.03) .
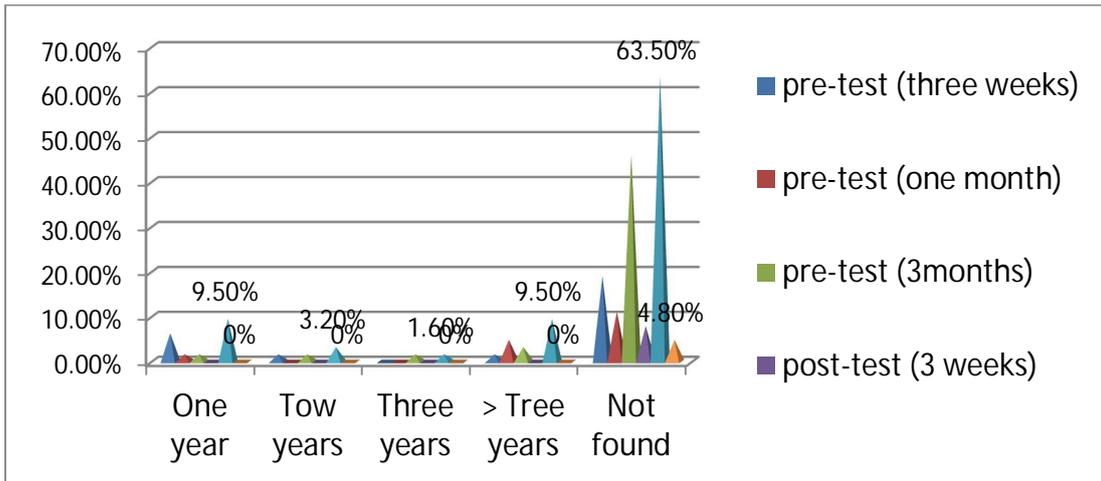
Pvalue:0.002
N:63

Figure (11) :Clarified that there were is statistical relation between nurse's years of experience and knowledge about potency of opened insulin vial in post-test 2. P value was 0.002

Table 9: Nurses knowledge regarding position of the needle during injection and rotating of mixed insulin vial.

Knowledge regarding Position of the needle	Pre- test		Post- test 1		Post- test2		P. value
		%	F	%	F	%	
45degree	21	33.3%	11	17.5%	4	6.3%	0.000
75 degree	31	49.2%	12	19%	7	11%	
90 degree	11	17.5%	40	63.5%	52	82.5%	
Total	63	100%	63	100	63	100	
Knowledge regarding rotation of mixed insulin vial	Pre- test		Post- test 1		Post- test2		P. value
Poor	33	52.4%	18	28.6%	8	12.7%	0.000
Satisfied	17	27%	11	17.4%	11	17.5%	
Good	13	20.6%	34	54%	44	69.8%	

P value 0.000

N:63

The table illustrated that only (17.5%) know the proper position of the needle when injecting insulin, the knowledge improved in (63.5%) and (82.5%) post-test 1 & post-test 2, and also clarified the knowledge of nurses   regarding rotating of mixed insulin vial, only (20.6 %) had good knowledge pre- test, whereas the knowledge increased after applying program to (54%) post-test 1and to (69.8%) in post-test2.(P. value 0.00)
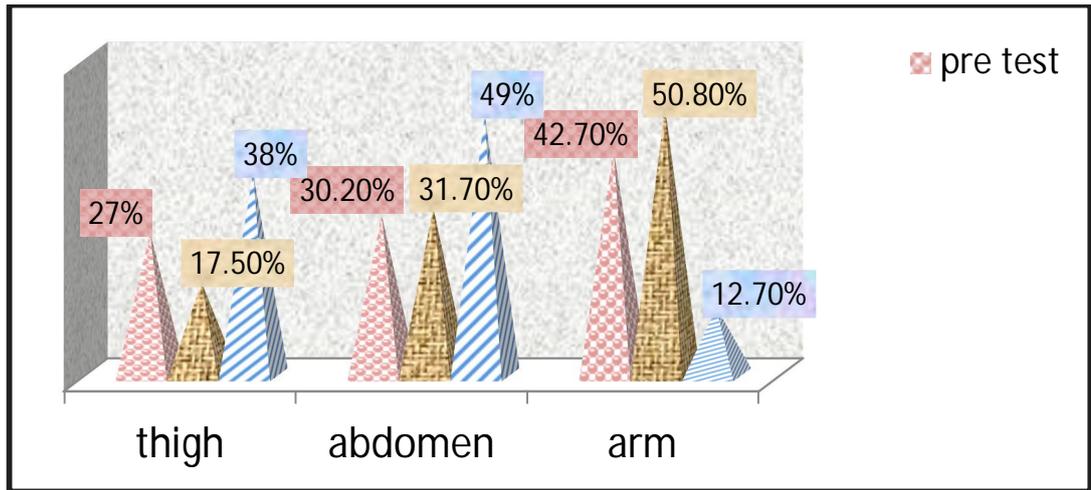
Figure (12):Clarified that third (30.2%) of them had a good knowledge about site of fast absorption (abdomen), while this result increased slightly after application of program to (31.7%) in post-test 1 and (49%) in post-test2.
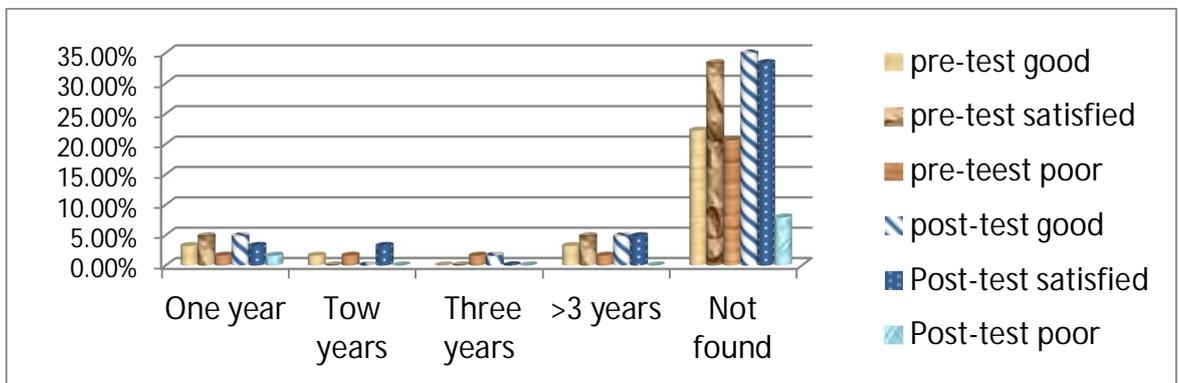
Figure (13) : Illustrated statistical association between nurses years of experience and knowledge about area of fastest insulin absorption. (P value was 0.001).

Table 10:Nurses knowledge regarding space between injection sites and insulin injection in hypertrophied area.

Knowledge regarding the space between injection	Pre test		Post- test 1		Post- test2		P. value
	F	%	F	%	F	%	0. 000
2inch	30	47.7%	7	11.1%	4	6.3%	
2cm	20	31.7%	8	12.7%	3	4.8%	
1cm	13	20.6%	48	76.2%	56	88.8%	
Total	63	100%	63	100	63	100	
Knowledge regarding injection in hypertrophied area	Pre –test		Post- test 1		Post- test2		P. value
	F	%	F	%	F	%	0.000
Poor	46	73%	15	23.8%	7	11.1%	
Satisfied	7	11.1%	7	11.1%	4	6.3%	
Good	10	15.9%	41	65.1%	52	82.5%	
Total	63	100.0%	63	100	63	100.0%	

P value:0.000
N:63

The table clarified that the space between injections was known only by (20.6 %) of studied group this knowledge was improved in posttest 1 and posttest 2 to (76.2%) and to (88.8%) respectively. Whereas the knowledge of nurses regarding insulin absorption when injected in hypertrophied area. Near three quarters (73%) were having poor knowledge, after the program it was reduced to (23.8 %) in posttest 1 and (11.1%) in post-test 2. (P. value 0.000).

Table 11: Nurse's knowledge regarding the effect of rubbing the site of injection and rotation of injection site.

Knowledge about rubbing injection site	Pre- Test		Post- Test 1		Post- Test2		P. value
	F	%	F	%	F	%	
Poor	35	55.6%	9	14.3%	6	9.4%	
Satisfied	15	23.8%	9	14.3%	7	10.9%	0.000
Good	13	20.6%	45	71.4%	50	78.1%	
Total	63	100%	63	100	63	100	
Knowledge regarding rotation of injection site	Pre- test		Post- test 1		Post- test2		P. value
Poor	18	28.6%	16	25.4%	10	15.8%	0.000
Satisfied	25	39.7%	13	20.6%	12	19%	
Good	20	31.7%	34	54%	41	65.2%	
Total	63	100.0%	63	100.0%	63	100.0%	

P value: 0.000
N:63

The table clarified the knowledge of nurses regarding the effect of rubbing area of injection on insulin absorption, only (20.6 %) had good knowledge pre- test, whereas the knowledge increased after applying the program to(71.4%) in post-test 1and (78.1%) in post-test2 (P. value .000). Also it clarified the knowledge of nurses regarding rotation of injecting site , in pretest ,posttest 1 and posttest 2 , the satisfied knowledge was (39.7%),(20.6%) and(19%) respectively. Whereas the good knowledge was increased from (31.7%) in pretest to (54%) in posttest1 and posttest 2(65.2%) .p value : 0.000

4. Nurse's performance regarding insulin administration:
A. Insulin preparation:
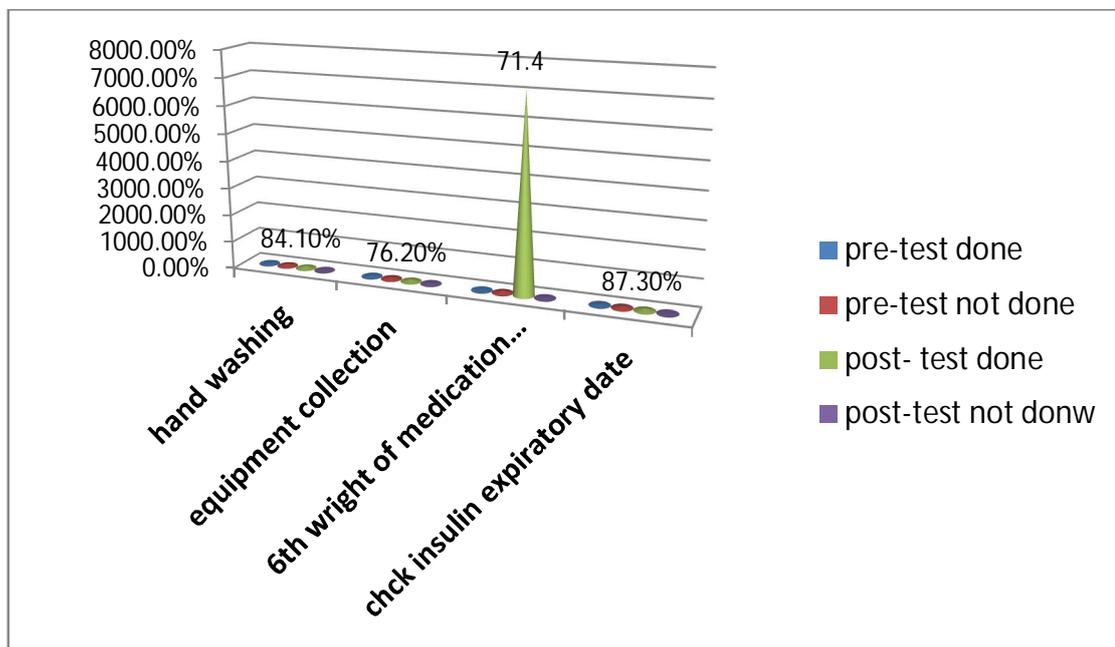
N:63

Figure (14):Illustrated the performance regarding hand washing (23.8%) did hand washing pretest whereas this result increased to (84.1) in 2. Also showed equipment collection third of studied group(33.3%) collected equipment in pretest, while the result was increased to (76.2) in 2. Regarding 6th wrights of medication administration only(22.2%) did them in pre-test.
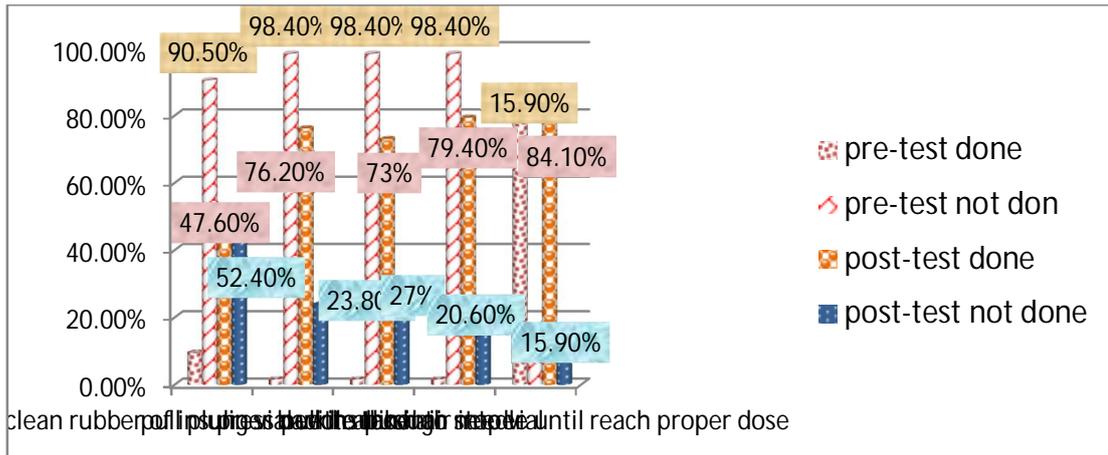
N:63

Figure (15) :Clarified that only(9.5%) of study group in pretest clean rubber of vial with alcohol, but still < than half of them performed it after implementation of the program .Regarding pulling plunger back to take air only (1.6%) performed it, whereas performance improved in post-test2 to (76.2%). About pressing needle through stopper , only (1.6%) did pre-test. Performance regarding pushing air into the vial only (1.6%) did it pre-test whereas was done by (79.1%) in post-test2. pulling insulin into syringe until reaching line of the proper dose were done by (84.1%) in pre-test .

Table 12: General nurses performance regarding steps of insulin preparation.

Nurses performance	Pre-test		Post-test1		Post-test2	
	F	%	F	%	F	%
Poor	54	85.7%	22	34.9%	2	3.2%
Fair	7	11.1%	30	47.6%	22	34.9%
Good	2	3.2%	11	17.5%	39	61.9%
Total	63	100%	63	100%	63	100%

N:63

The table illustrated that the general performance of nurses about insulin preparation was good in only (3.2)% in pretest whereas the general performance were improved after implementing program to be good in (61.9%) in post-test 2.
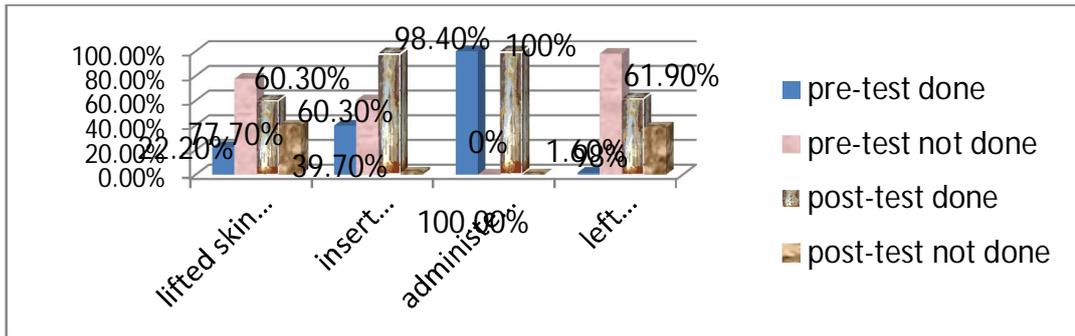
N:63

Figure (16): Illustrate the performance regarding insulin injection: lifted skin fold there was (22.2%) lifted skin pre-test whereas the result increased to (60.3%%) in posttest2,.About inserting needle at 90 degree only (30.7%) insert needle in pretest while this result increased in post-test 2 to (98.4%) respectively. Regarding leave needle in the skin about at least 10 seconds only(1.6%) did it in pre- test whereas the result was increased in 2 to (61.9%).
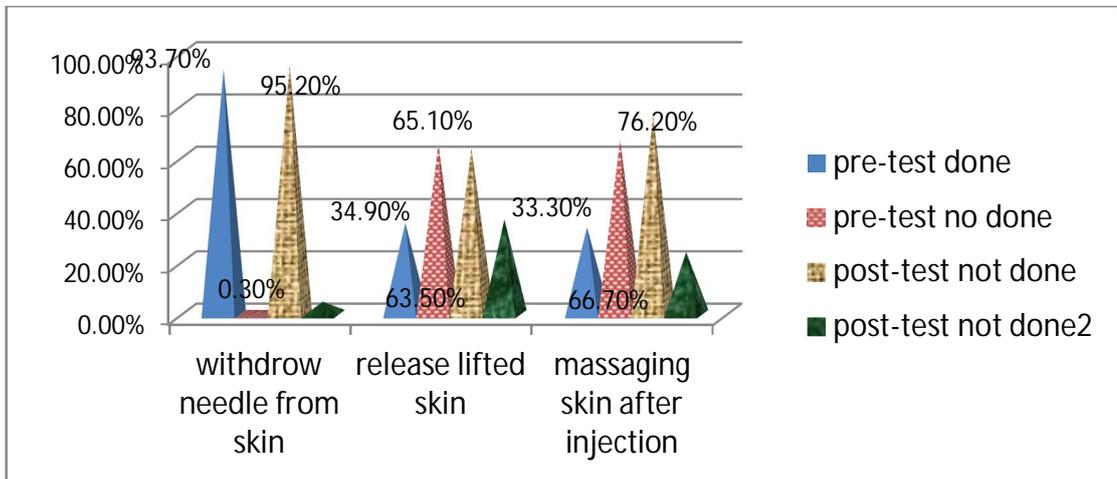
N:63

Figure (17) :Showed that (93.7%) of studied group withdraw needle from the skin in pre –test, (34.9%) they released skin fold pre-test, and about massaging area of injection one third of studied group do it pre-test while the result was raised in post-test 2 to 76.2%.

Table 13:General performance regarding insulin injection

Nurses performance	Pre-test		Post-test1		Post-test2	
	F	%	F	%	F	%
Poor	40	63.5%7%	14	22.2%%	1	1.6%
Fair	18	28.6%%	34	54%%	27	42.9%
Good	5	7.9%%	15	23.8%%	35	55.5%
Total	63	100%	63	100%	63	100%

N:63

The table illustrated   that the general performance of nurses about insulin injection in pretest in   more than half of studied group (63.5%) was poor whereas this result decreased after implementing program to(22.2 %),(1.6%) in posttest 1 & posttest 2 respectively.
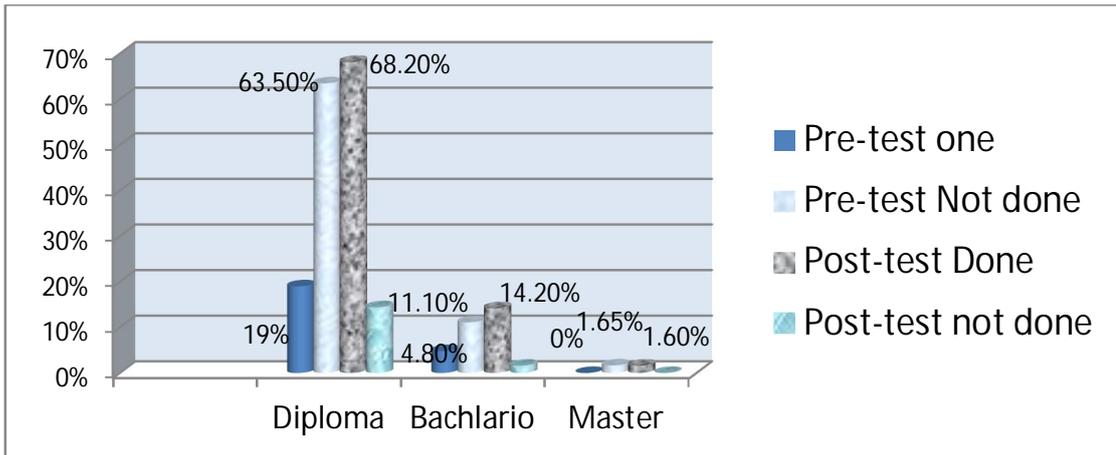
P value : 0.091

N:63

Figure (18): Illustrated there was no statistical relation between nurses degree of graduation and performance regarding hand washing P. value 0.091 in post-test2.
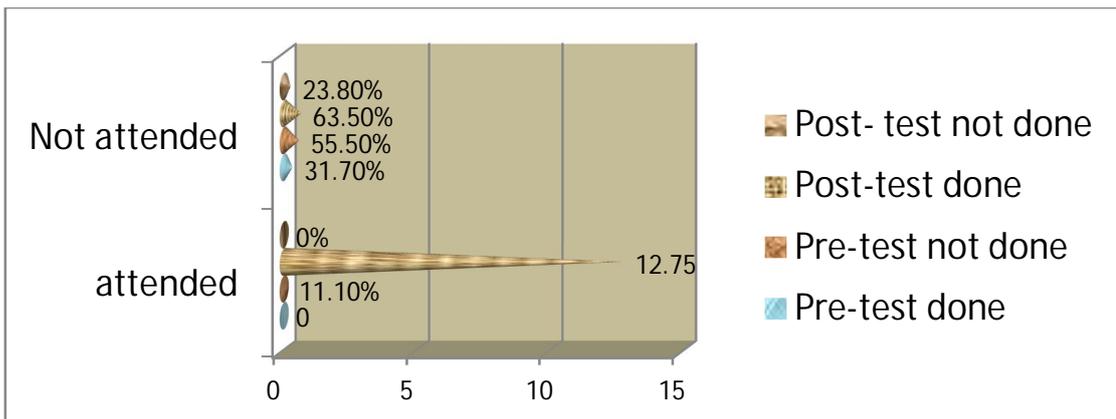
P value : 0.213

N:63

Figure (19): Illustrated that there was no statistical relation between attending course in diabetes and performance of studied group regarding equipment collection P value 0.213 I n post-test 2.
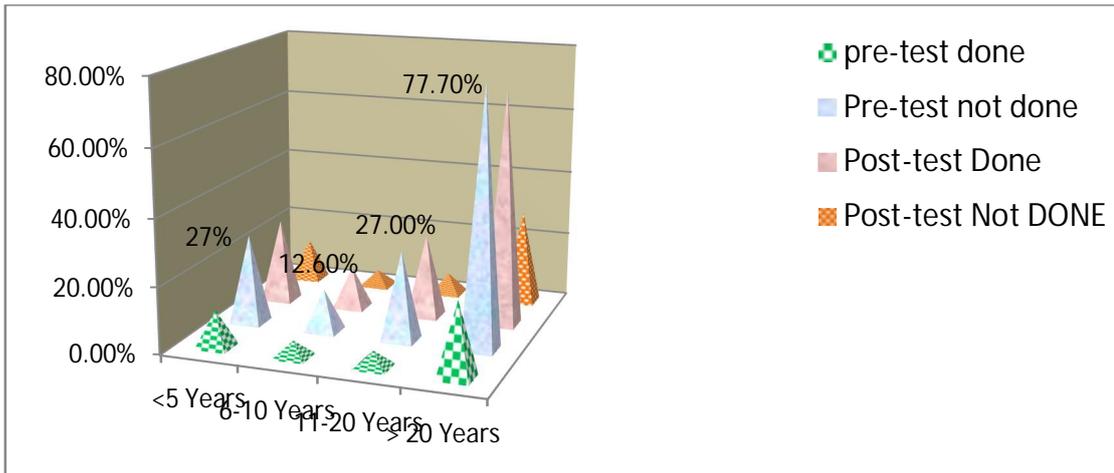
P. value 0.046
N:63

Figure (20) :Illustrated there was statistical significance relation between duration of working and performance regarding 6th wrights of medication administration. P. value 0.046 in posttest2
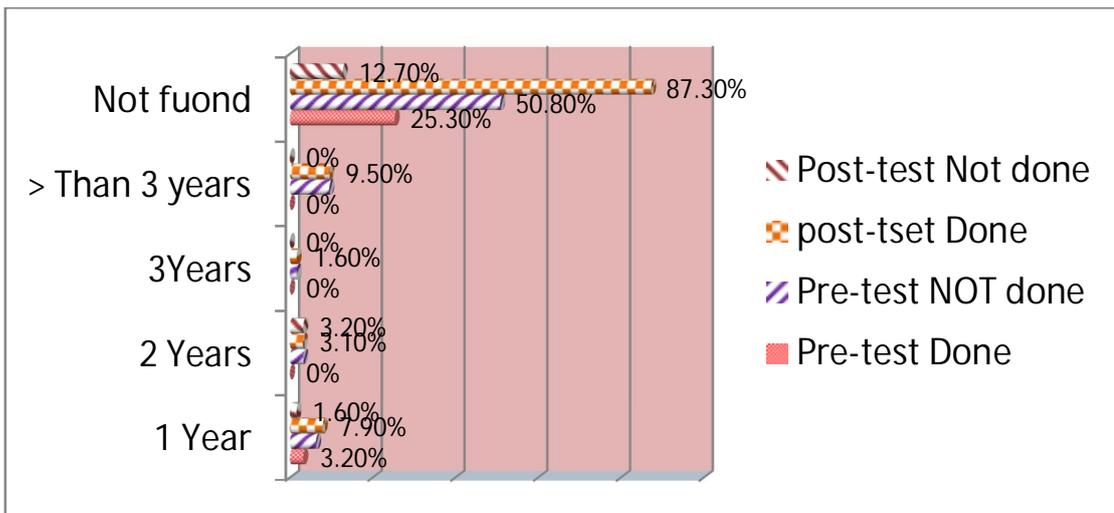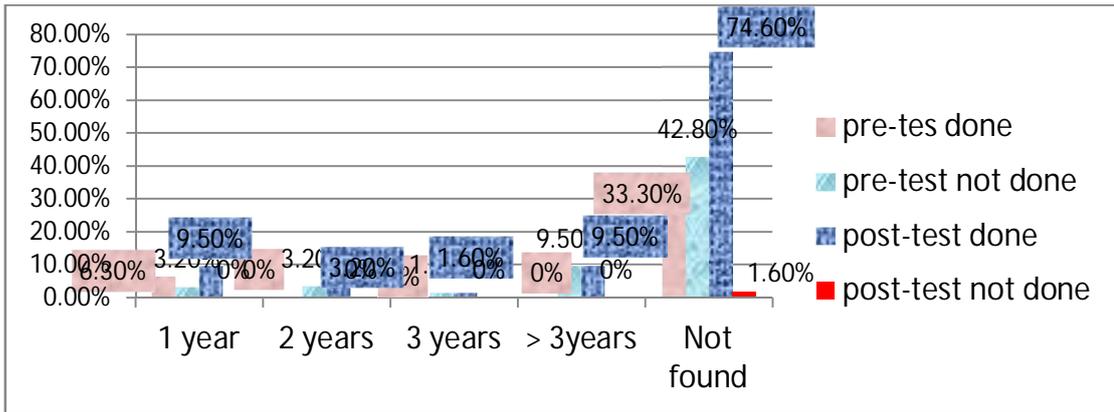

P value 0.031
N:63

Figure (21): Clarified that there was statistical relation in pre & post- test intervention between nurses years of experience and performance regarding check insulin expiration date. P value 0.031 in post-test 2.
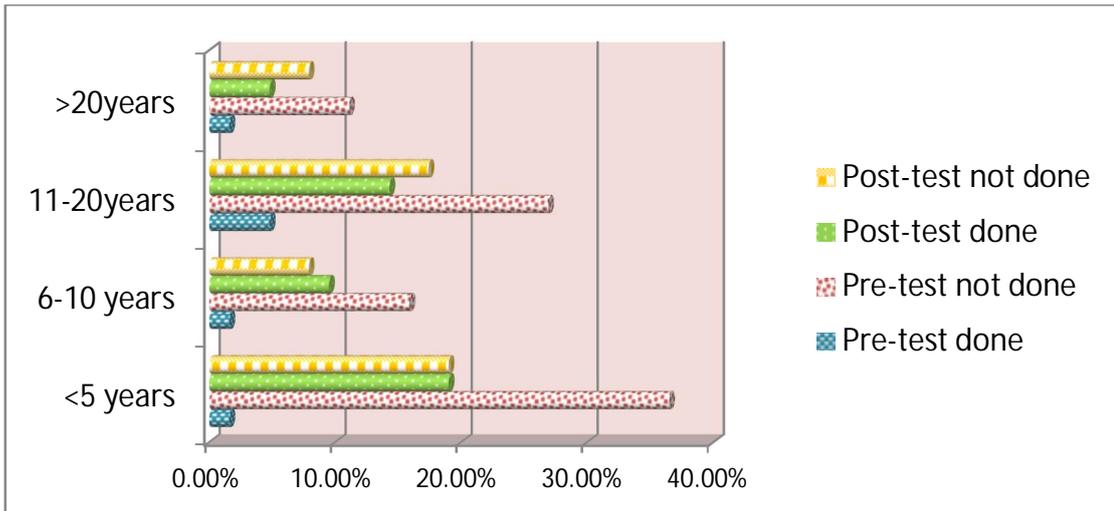
P value: 0.080

N:63

Figure (22): Illustrated that there was no statistical relation between duration of working and performance regarding clean rubber of insulin vial before withdrawal of insulin P .value was .0.143&. 0.080 pretest and post-test 2 respectively.
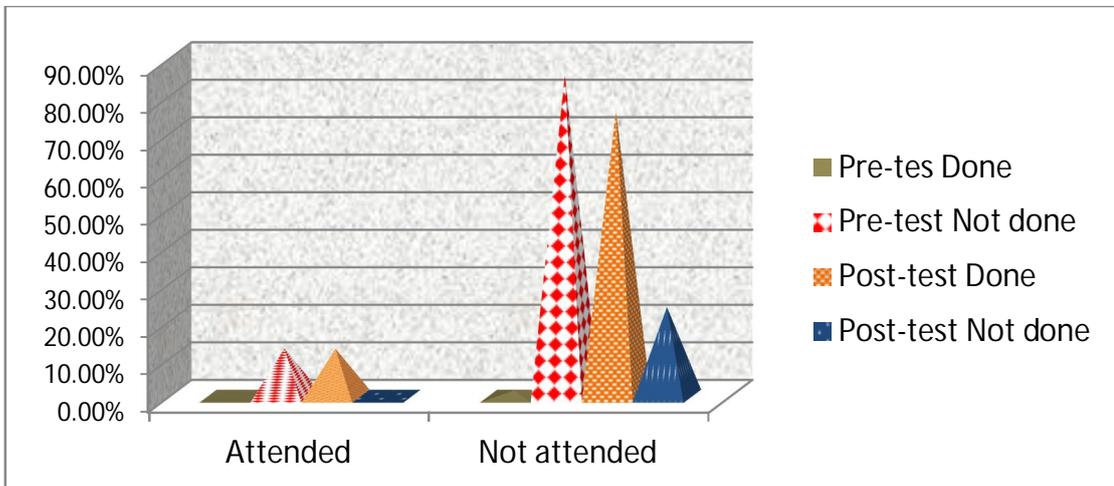
P value 0.213

N:63

Figure (23) :Clarified that there was no relation between pre & post intervention between attending course in diabetes and performance regarding pull plunger back to pull air into syringe. P value 0.213 in post-test2.
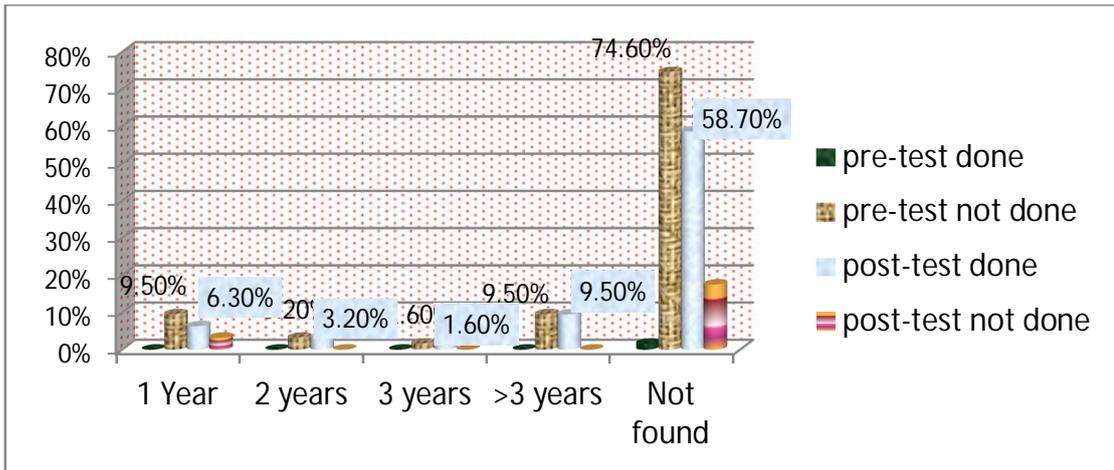
P value: 0.005

N:63

Figure (24): Clarified that there was statistical relation in pre & post intervention between years of experience in diabetes and performance regarding pull plunger back to pull air into vial. P value 0.005 in post-test2.
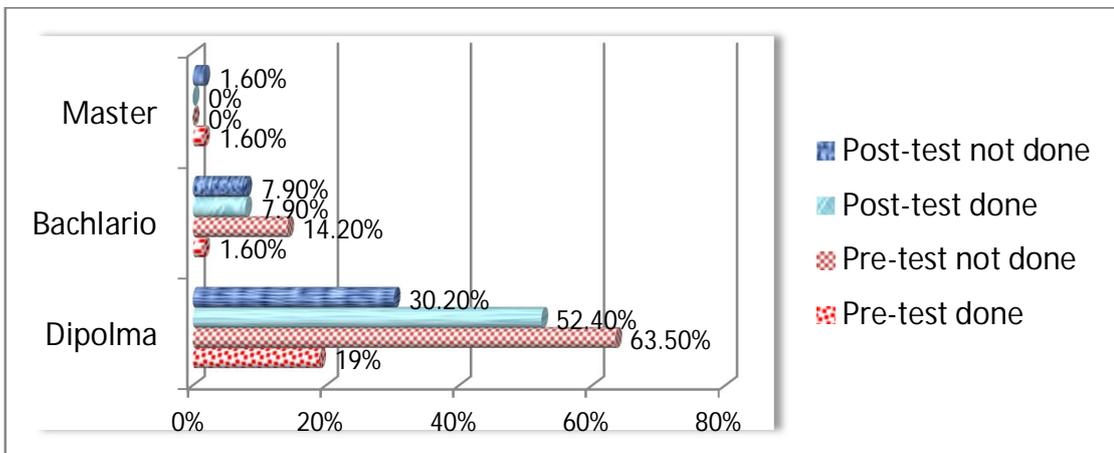

P value:0.168

N:63

Figure (25): Showed that there was no statistical relation in pre- test & post-test intervention between degree of graduation and nurses performance about lifted skin fold . p value -0.030- & 0.168 in pre-test and post-test .

insert needle at 90 degree . p value -0.060- & 0.168 in pre-test and post-test .
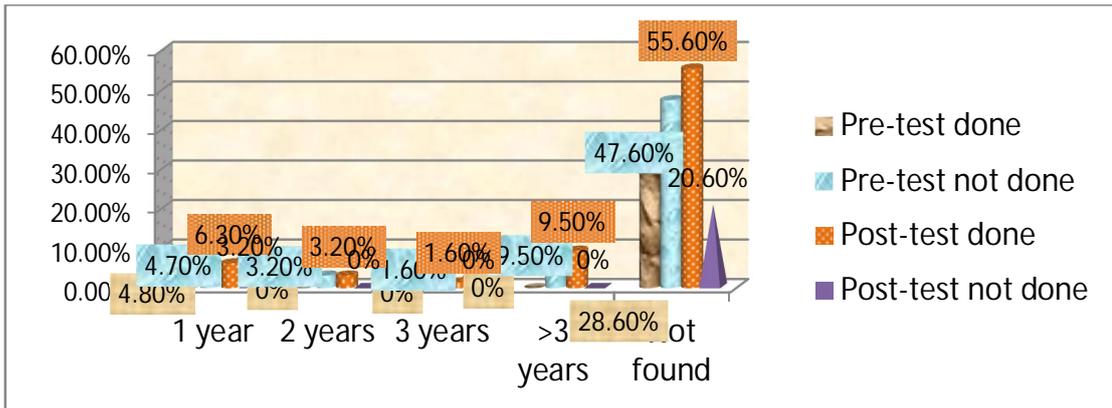
P value: 0.060

N:63

Figure (26) :Illustrated that there was an statistical relation between years of experience and nurses performance regarding insert needle at 90 degree.
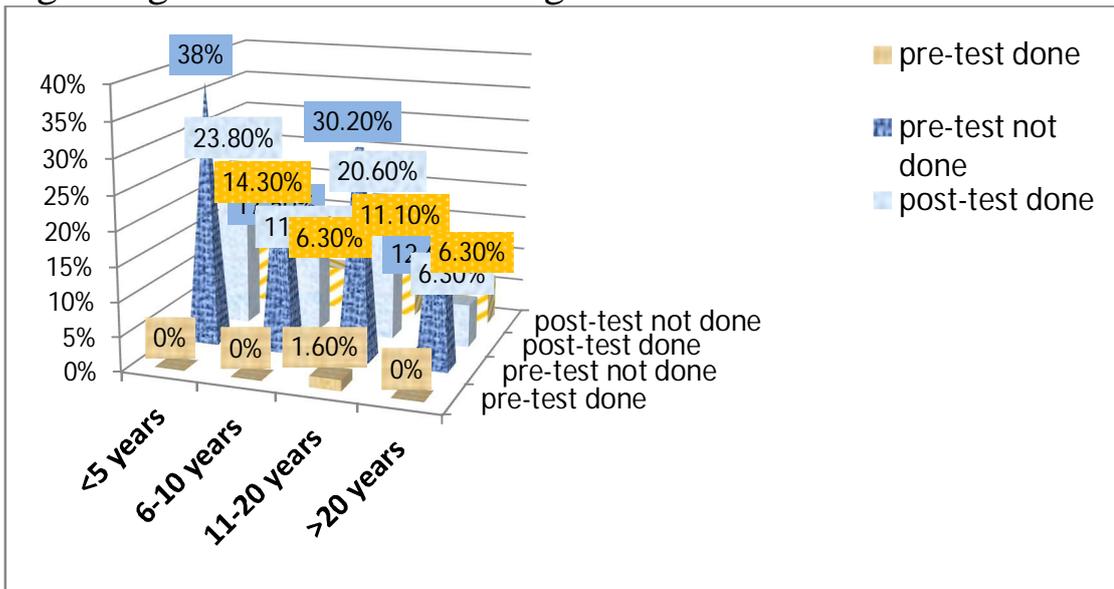
P value 0.043

N:63

Figure (27) Clarified that there was statistical association between duration of working and performance regarding left needle about at least 10 seconds in post-test 2.

P value : 0.031
N:63

Figure (28): Clarified that there was statistical relation between years of experience and performance regarding massaging area of injection P value in post-test 2 was 0.031.

5.Discussion

       The role of clinical nurse with increase of diabetic patients has become important in the care needs for diabetic patients . It is reported to decrease the reliability of the patients on the nurses with the inconsistent care for the diabetes patients. [86]
This study was carried out to assess nurses' knowledge about diabetes focusing on type 1 diabetes mellitus , insulin management and performance regarding insulin administration. Adjustment of the content of the questions was carried out , according to the latest guidelines of European diabetes association and American diabetes association.[87-88]

     Diabetes knowledge was assessed in 63 nurses working in Kosti hospital.(36.5%) of them their ages range between (20-30) years , (38.1%) were working for less than 5 years and (87.5%) of them didn't attend a course in diabetes mellitus care. This may be reflected in their knowledge and experience. About area of working only (19%) work in the pediatric ward . They had no experience in diabetic care (23.8%) of study group had experience and (9.5%) had experience more than three years.

     There is evidence of genetic, autoimmune and environmental factors contributing for occurrence of type1 diabetes.[89]This fact was known by (9.5%) of study group initially which increased to (82.5%) after the program. The degree of graduation was mainly diploma so the knowledge about the etiology of diabetes was affected by their academic qualification (P value =0.000). In addition minority (19%) can distinguish between type 1 and type 2 diabetes. type 1 diabetes is due to autoimmune B-cell destruction, usually leading to absolute insulin deficiency.[90] Laboratory diagnosis of diabetes was based on the diagnostic criteria for diabetes.[90] one third(30.2%) didn't know this criteria pre intervention, decreased to (12.7%) in post-test 2. This result of deficient knowledge was supported by Roman et al in their

study to assess the diabetic related knowledge of medical and nursing house staff focus in patient diabetes management and insulin therapy, and found that knowledge was highest for physicians in internal medicine and surgery , with nurses in internal medicine and surgery had the same level of knowledge. [91] Additionally the knowledge about treatment of type 1 diabetes among studied nurses was poor and this will lead to reduced knowledge of patients. This was supported by Indi S, finding in 2015 who revealed that the majority of studied subjects had inadequate knowledge before nursing intervention that had improved after nursing intervention. [92]

Nurses demonstrated deficient knowledge regarding initial management of hypoglycemia (26.9%) ,better than reported by Engvall et al , who found that (10%) of nurses responded by using a quick – acting carbohydrate.[93] .Only (14.3%) of nurses responded correctly to questions of knowledge related to treatment of type 1 diabetes in pretest whereas this knowledge was increased in post test2 to (79.4%) . Statistical significant effect of the program was justified (p value was 0.03) .All people with type 1 diabetes require regular insulin therapy to live.[1] Knowledge regarding intervention in case of hyperglycemia is better were (44.4%) responded correctly.

Proper diabetic control is important to maintain glycemic control and hence prevent complications. Hb $A1_C$ is used to assess control in the last 3Months.[94] Nurses had poor knowledge regarding this test and it's normal range. Nurses in Turkey concluded that they feel uncomfortable in guiding clients regarding the monitoring of glycemic test and Glycated hemoglobin.[95]

Injectable medicines including insulin should be stored according to the manufacturer's instructions, considering length of time medicine can be stored when open, , and the expiry date of the medicine. Insulin should be discarded if it is past the expiry date on the bottle or if the vial has been open for more than a month.[90] (17.4%) know the potency of open insulin vial but the knowledge improved to

(80.9%) after implementing the program Good knowledge of dividing area of injection was found in only (20.6%) of the responders .This corresponds to what found in Northern Ireland , that practitioners presented knowledge deficits in relation to the technique, the need for rotation of the injection site and the pharmacological action. [96] In addition(49.2%) of study sample responded wrong in the area of position of needle when injecting insulin . The needle should be at a 90 degree angle if the person of is normal weight or heavy or at a 45 degree angle if the person is thin. [97]

Inadequate knowledge also was found in relation to time of rotating mixed insulin vial. The recommended   method is gentle mixing by tipping (rocking) and rolling the insulin 10-20 times until the mixture is even in color without any visible particles.[98] Correct mixing of insulin suspensions reduces the risk of hypoglycemia and variability in the action of the injected medicine.[99]

   one third (30.2%) responded correctly to question of knowledge related to site of faster absorption. Also poor knowledge about space between injection & injection in hypertrophied was found in (47.7%) and (73 %) respectively. Injecting within any quadrant or half should be spaced at least 1 cm from each other in order to avoid repeat tissue trauma. [66] ,This is supported by Namita SA, who said that lack of organized health education and negligence of health care workers on diabetes and insulin self – administration and inadequate knowledge regarding site of insulin injection may lead to develop complication of insulin therapy. [100] Additionally   nurses demonstrated deficient knowledge (55.6%) on the effect of rubbing the site of injection and (31.7%) had deficient knowledge related to rotation of injection site. Rotation within one area rather than rotating to a   different   area   for   each   injection   is recommended.[101]Continued use of sites already affected with lipohypertrophy has been shown to hamper   insulin absorption.[102] Frid A et al described effective method of rotation is to divide   the injection site into quadrants

(abdomen) or halves (buttock or thigh), using one quadrant per week and moving clockwise around this area.[103]

This study also revealed that there was a positive correlation in post-intervention between degree of graduation and nurses knowledge about laboratory diagnosis (p. value 0.004).

The duration of experience didn't affect nurses knowledge regarding initial intervention in case of hypoglycemia as there was a negative correlation between years of experience and nurses knowledge about initial action in case of hypoglycemia.

Healthcare professionals and nurses are responsible for people insulin administration for hospitalized patients with diabetes therefore the knowledge , practice , and commitment are key factors for controlling patients' blood sugar levels and for educating patients and their relatives for correct insulin injection technique. [96] However , present study showed in consistency between insulin injection practice of nurses and insulin deliver recommendation , consistent with what was described in Ireland and Pakistan. [91-96]

This study revealed poor performance pre- program concerning hand washing(76.2%), compared to, Robb,B et al in 2016 who reported better performance of hand washing(92.5%).[96] The performance increased to (84.1% %) after the program. Moran B and Arnott S ,suggested in the guidelines for the administration of insulin that both clean, washed hands and the use of gloves should be practiced routinely within a hospital environment. [104] Although these gloves are not sterile, American Diabetes Association recommended that they can be used to help prevent the transfer of resident bacteria from the fingers to the vial or injection site, thus minimizing infection. [101]

Nurses performance was poor in collecting equipment, performing 6th wright of medication administration, checking insulin expiry date and cleaning the rubber. Frid A H et al observed better nurses performance in their study (92%) did it. [105]As clearly observed, when insulin withdrawals were made from a single vial and without the flacon top being

disinfected between each withdrawal, microorganisms could potentially colonize in the contents of the vial. The practice of disinfecting the flacon top before aspiration was not followed routinely by the majority of nurses in this sample .Yet, according to the American Diabetes Association wiping the rubber cover of the insulin vial with a 70% alcohol swab is a standardized measure for infection prevention. [106] Additionally (98.4%) they didn't pull plunger back to take air, whereas this result was decreased after implementing program to (23.8%).

Regarding lifting skin fold (77.7%) didn't perform it. A better but not good performance was reported by A. H. Hirsh L.J et al . who reported that (50.7%) of studied nurses were found not to be lifting the skin when injecting insulin.[105].Proper lifting improved to (60.1 %) after intervention. The purpose of using a lifted skin fold is to reduce the risk of IM injection by increasing the space between the skin and muscle fascia.[107]   All people with diabetes /carers should be taught the correct technique for lifting a skin fold from the onset of injection therapy. Two fingers should be used to lift the skin away from the muscle fascia . Ideally this should be the thumb and first or second finger. Regarding angle of injection (58.7%) of study sample insert needle at 90° degree which is the recommended needle angle for subcutaneous injections; a 45 ° angle may be used for very thin patients or young children. For either angle, injecting into a skinfold created using the index finger and thumb only is recommended in both   cases. [108] Nurses performance regarding lifting the needle after injection for seconds was very poor as less than 5% did it. This is a lower knowledge than what was described by (Pledger ,j.et al) as (52.2%) of nurses keep the needle under the skin for at least 5 seconds after completely inserting the required dose of insulin. [109] This skill was performed by (61.9 %) after the program.

Massaging the site before or after injection may speed up absorption and is not recommended. [110] About third(33.3%)

of studied sample did it pretest . this performance was improved after the program to (55.6%),(76.2%) in post-test 1 & post-test2 respectively.

General performance regarding insulin preparation was improved as the good performance raised from (3.2%)in pre-test to(61.9%) in post-test2. General performance regarding insulin injection technique was improved as the good performance raised from (9.5 %) in pre-test to(55.5%) in post-test2.

The study revealed that there was no statistical association between degree of graduation and hand washing, , attending course in diabetes and equipment collection duration of working performance regarding 6th write of medication administration,   p.   value   was   (0.091),(0.213),(0.046) respectively. But there was a positive correlation between duration   of   working   and   6   wright   of   medication administration in post-test2 (p value was 0.046) .Also there was a statistical significant association between years of experience and performance regarding checking insulin expiratory date. P value 0.031.

The study results supports that overall compliance with international guidelines regarding insulin administration techniques was not reflected in the current research findings , nor in   practice guidelines and evidence based care recommendations.

Conclusion

The study concluded that based on the finding :

-Nurse studied were predominantly females, (76.2%) didn't attend courses on diabetes care and (82.2%)their graduation was diploma degree.

-Nurses knowledge about etiology of type1 diabetes and distinguishing between type 1 and type 2 was poor before intervention which improved to good after the program with statistical significance Pvalue 0.000

-Despite the education intervention, knowledge regarding initial management in case of hypoglycemia remained inadequate as (60.3%) of nurses were able to identify the correct intervention by giving sweaty drinks.

-Years of experience had no effect on nurses knowledge regarding initial intervention in case of hypoglycemia p valu:0.172

-Nurses didn't know the potency of opened insulin vial, rotation of the vial of mixed insulin and position of the needle ,their knowledge became good after the program

-Less than quarter of nurses did hand washing before the program after the program(84.1%) washed their hands before insulin injection

-The nurses knowledge about targeted blood glucose when treating hypoglycemia despite education intervention increased from (14.3%) in pre-test to (50.8%) and (59.4%) in post -test 1 and 2 respectively. -Nurses performance regarding checking insulin expiry date and cleaning the rubber of insulin vial was poor but improved after intervention.

- (1.6%) of nurses were leaving the needle in the skin for at least 10 seconds increased to (61.9%) after the program

- (39.7%) were injecting insulin at 90 degree increased to(98.4%) post intervention

-Overall performance regarding insulin preparation was good in(3.2%) increased to (17.8%) in post- test 1 and to (61.9%) in post -test 2

- The general performance regarding technique of injection was good in only (7.9 %) increased to (55.5   %) after intervention.

-Over all nurses knowledge about diabetes and performance regarding insulin preparation and injection were improved significantly after the program .

Recommendations:

Based on the conclusion of the present study, the following is recommended:

- It is imperative to organize training program to ameliorate the knowledge and skills of nurses on the care of people with diabetes.

– Establishment of well-organized programs that use various forms of learning and teaching, can contribute to improving knowledge of nurses on issue related to the diabetes mellitus.

– Great emphasis should be directed towards the educational aspects on insulin preparation , administration and injection technique by providing educational posters , guidelines , manual and modern educational facilities.

– Alcohol swap should be applied when clean rubber of an insulin vial.

– Re –teaching and upgrading of available nurses should be carried out by other researcher

– Collaboration between institutions and federal ministry of health to perform annual insulin administration conference and workshop for nurses as a tool that help ensure consistent application of key elements of evidence practice in insulin administration.

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بسم الله الرحمن الرحيم

University of Shandi

Post graduate collage

Impact of Structured Teaching Program on Nurses Knowledge Regarding Type1 Diabetes Mellitus and Insulin administration White Nile State, Kosti Teaching Hospital 2013-2018

1.Demographic information

1.Age

a-20-30 years   (   )

b-31-40 years   (   )

c-41-50 years   (   )

d-above51years   (   )

2. Gender:

a- male   (   )

b- female   (   )

3.Degree of graduation:

a-Diploma   (   )

b-bachalrio   (   )

c-Master degree   (   )

d-PhD   (   )

4.Duration of the work as a nurse:

a- < 5 years   (   )

b- 5 - 10 years   (   )

c-11 - 20 years   (   )

d-more than 30 years   (   )

5.Attending of training courses on diabetic care:

a-attended   (   )

b-not attended   (   )

6.Years of experience on diabetic care:

a-less or equal to 1 year   (   )

b- 2 years c-3 years   (   )

d-more 3 years   (   )

e. not experience   (   )

7.Ward of working:

a- medicine ward   (   )

b- surgery ward   (   )

c- pediatric ward   (   )

d-casualty   (   )

2.Nurses knowledge about diabetes mellitus:

8.Type 1 diabetes thought to be:

a-an inherited genetic predisposition   (   )

 b-process stimulated by an environmental trigger, such as toxin drugs or chemical   (   )

 c-the production of endogenous insulin is not affected   (   )

d-all of the above   (   )

9.Type 1 diabetes distinguished from type 2 diabetes only by:

a-patient insulin resistance   (
)

b- insulin deficient without insulin resistance   (   )

d- none of the above   (   )

10. Diagnostic criteria for type 1 diabetes mellitus:

a-   Fast ing plasma glucose(FPG) >126 mg \dl (7.0 mmol\L)
( )

 b- 2 hours postprandial glucose >200 mg \dl (11.1mmol\L) ( )

c-random plasma glucose > 200 mg \dl in patient with classic symptoms of diabetes.   (   )

d- all of the above   (   )

11.Management of type 1 diabetes :

a- insulin   (   )

b- oral hypoglycemic tabs alone   (   )

 c- insulin, exercise and nutrition   (   )

d- all of the above   (   )

12.When the blood glucose level reach 70 mmol the patient should:

a-take sweaty meal   (   )

 b-notify the doctor   (   )

 c- wait until the other result of blood   (   )

d- all of the above   (   )

13.When the blood glucose level reach 300mg(11,6mmol)the nurse should do?

a-   urine test for acetone   (   )
b-   b-not give insulin   (   )
c-take meal not containing sugar   (   )

14. Investigation used to identify diabetes control within the last 3 months:

a-urine for acetone   (   )
b-blood glucose   (   )
c-HbA1C   (   )
d- none of the above   (   )

15. Normal level of HBAC1:

   a- 6% - 6.5%   (   )
    b   6.6- 7%%   (   )
a-   >7%   (   )

16.When treating hypoglycemia during day the blood glucose should reach?

a/70mg/dl   (   )
 b/100mg/dl   (   )
c- more than 100mg/dl   (   )

3.Nurses knowledge about insulin

17.In type 1 diabetes insulin sensitivity by the body

   a. Increased   (   )
b-   Normal   (   )
c-   decreased   (   )
d-   c- do not affected   (   )

18.The intermediate insulin remains potent and effective after the bottle has been opened (if keep in the refrigerator between injection for up to:

a.1 month   (   )
b-2 months   (   )
c- 3 months   (   )
d- 3weeks   (   )

19.When injecting insulin into abdomen the abdomen should divided into:

a-halves   ( )

b-quadrants   ( )

c- not important to divide the area   ( )

20. The peak action of soluble insulin is :

 a- 2-4 hours   ( )

b- half an hour – 2 hours   ( )

c- 7 hours   ( )

d- none of the above   ( )

21.When injecting insulin the needle should be:

a- at 90 degree   ( )

b-   at 45 degree   ( )

c-   c- At 75 degree   ( )

22.When you want to inject mixted insulin you can rotate the vial:

a-3 times   ( )

 b- 5 times   ( )

c- 10 times   ( )

23.The injection site with faster insulin absorption is:

a/abdomen   ( )

 b/arms   ( )

 c/thigh   ( )

24. Space between injection sites should be at least::

a.1cm   ( )

b.2 inch   ( )

c.2cm   **( )**

25.When insulin injected in lipohyprtrophy area the absorption will be:

a-   Fast   ( )

b-   slowly   ( )

c-   not affected by lipohypertrophic area   ( )

26.To reduce the pain during insulin injection you should :
a- use fine needle   (   )
b- use short needle   (   )
 c- both short and fine.   (   )

27.Rubbing the skin after insulin injection   cause insulin absorption to be-:
a.   Slow   (   )
b.   rapid   (   )
c.   not affected   (   )

28.Best injection site for morning dose of mixture insulin is:
a.   gluteal muscle   (   )
b.   deltoid muscle   (   )
c.   abdomen   (   )
d.   thigh   (   )

29.The site of injection should be rotated to prevent:
a-   lipohyprtrophy   (   )
b-   hypertrophy   (   )
c-   skin blanching   (   )
d-   none of the above   (   )

بسم الله الرحمن الرحيم

جامعة شندي

كلية الدراسات العليا والبحث العلمي

الأخ /...

المحترم

السلام عليكم ورحمة الله تعال وبركاته

الموضوع: استبيان

أرجو من سيادتكم التكرم بالإجابة على أسئلة الاستبانة المرفقة وذلك لاستكمال

دراستي لنيل درجة الدكتوراه في تمريض الأطفال بعنوان :

تقييم ممرضي مستشفى كوستى عن معرفتهم بمرض السكر النوع الأول

وحقن الأنسولين

ونقدر دوركم الفاعل في البحوث العلمية، علما بأن البيانات سيتم

استخدامها لأغراض البحث العلمي فقط وستعامل بسرية تامة.

وتقبلوا وافر الشكر والتقدير ،،،

أولا : البيانات الشخصية:

الرجاء التكرم بوضع علامة (√) أمام الخيار المناسب :

١/ العمر:

أ- ٢٠-٣٠ سنة (   )　　　　ب-٣١ – ٤٠ سنة (   )

ج-٤١-٥٠ سنة (   )　　　　د- أكثر من ٥٠ سنة (   )

٢/ النوع:

أ- ذكر (   )　　　　ب- أنثي (   )

٣/ درجة التخرج:

أ- دبلوم (   )　ب- بكالوريوس (   )　ج- ماجستير(   )

٤/ فترة العمل في التمريض:

أ- فترة العمل في مهنة اقل من ٥ سنوات (   )　ب- ٥ – ١٠ سنوات (   )

ج-١١-٢٠ سنة (   )　د- أكثر من ٢٠ عام (   )

٥/ تعمل في عبر:

أ- باطنية (   )　ب- جراحة (   )　ج- أطفال (   )　د الحوادث (   )

٦/ لديك سنوات خبرة في رعاية مرض السكر النوع الاول:

أ- نعم (   )　ب- لا (   )

٧/ المشاركة في كورسات لرعاية مرضي السكري

أ- شاركت (   )　ب- لم تتاح لي الفرصة (   )

ثانياً : معلومات عن مرض سكري الأطفال :

٨/ العوامل التي تساعد علي الإصابة بمرض السكر النوع الاول:

أ- عوامل وراثية   (   )   ب- عوامل بيئية مثل المواد الكيميائية والأدوية (   )

ج- الالتهابات الفيروسية (   ) د- عدم كفاية إنتاجية الأنسولين (   ) هـ- كل ما ذكر

صحيح

٩/ التميز بين مرض السكر النوع الاول من النوع الثاني ب :

أ- مقاومة المريض للأنسولين (   )   ب- نقصان الأنسولين مع عدم مقاومته (   )

ج – لا توجد إجابة   (   )

١٠/ يتم تشخيص مرض السكر عندما يكون :

أ - معدل الجلوكوز في الدم عشوائيا أكثر من ١٠٠ ملغ/ ديسيلتر   (   )

ب - معدل الجلوكوز بعد ساعتين من إعطاء جلوكوز ٥٠% يعادل أو أكثر من

٢٠٠ملغ / ديسيلتر (   )

ج- فحص السكر في حالة الصيام أكثر من أو يساوي ١٨٠ ملغ / ديسيلتر

١١/ يعالج مرض السكر النوع الاول (سكر الأطفال):

أ- أنسولين فقط   (   )   ب- حبوب السكر (التنظيم) (   )

ج- تغذية وأنسولين مع الرياضة (   )   د- كل ما ذكر صحيح   (

)

١٢/ اذا كان تحليل الدم في السكر اقل من ٧٠ ملغ (٤ملمول) يجب إعطاء

علي الممرض:

أ - إعطاء المريض شراب محلي   (   )   ب- إخطار الطبيب فورا (

)

ج- الانتظار حتي زمن الجرعة القادمة (   )

١٣/ اذا كان تحليل السكر في الدم ٣٠٠ ملغ (١١.٦ ملمول) يجب علي الممرض:

أ – فحص البول للأستون   (   )   ب- عدم اخذ الأنسولين والاتصال بالطبيب فورا

(   )

ج – إعطاء الطفل وجبة إضافية أخري   (   )

١٤/ التحليل الذي يجري لمعرفة نسبة السكر في الدم خلال ٢-٣ شهور السابقة هو:

أ-البول للأستون (   )   ب- الدم للسكر (   )   ج – الهيموغلوبين السكري (   )

(

١٥/ المعدل الطبيعي للهيموغلوبين السكري في الدم هو:

أ - ٦% - ٦.٥% (   )   ب- ٦.٦% -٧% (   )   ج-أكثر من ٧%(   )

١٦/ عند معالجة نقصان السكر يجب ان يكون معدل الجلكوز في الدم:

أ - ٧٠ملغ/ ديسيلتر (   )   ب- ١٠٠ ملغ/ ديسيلتر(   )

ج – أكثر من ١٠٠ملغ/ديسيلتر(   )

ثالثاً: معلومات عن الأنسولين

١٧/ تكون حساسية الأنسولين في النوع الأول:

أ- طبيعية (   )   ب- تزداد (   )   ج- تنقص (   )   د- لا تتأثر (   )

١٨/ الأنسولين متوسط المفعول يحتفظ بفاعليته وهو مفتوح في الثلاجة لمدة:

أ- شهر   (   )   ب- شهرين(   )   ج- ثلاثة أشهر(   )   د- ثلاثة أسابيع(

)

١٩/ عند حقن الأنسولين في البطن يجب تقسيم البطن الي :

أ- أرباع ( ) ب- نصفين ( ) ج- لا توجد أهمية لتقسيم منطقة الحقن ( )

٢٠/ يسري مفعول الأنسولين الصافي :

أ- ٤-٦ ساعات ( ) ب — ساعتان ٤ ساعات ( )

ج- ٧ ساعات ( ) د- كل ما ذكر خطأ ( )

٢١/ عند إعطاء حقنة الأنسولين يجب ان تكون الإبرة :

أ- في خط موازي للجلد ( ) ب- في زاوية ٩٠ درجة ( ) ج - في زاوية ٤٥ درجة ( )

٢٢/ كم مرة يجب ان يفرك الأنسولين المخلوط حتي يكون لونه كلون اللبن؟

أ- ٣ مرات ( ) ب -٥ مرات ( ) ج ١٠ – مرات. ( )

٢٣/ يكون امتصاص الأنسولين سريع اذا تم حقنه:

أ - البطن ( ) ب- العضل ( ) ج – الفخذ ( )

٢٤/ اذا كان هنالك تقسيم منطقة الحقن فيجب ان تكون المسافة بين النصفين أو الأرباع :

أ- ١ سم ( ) ب- ١ بوصة ( ) ج- ٢ سم ( )

٢٥/ اذا تم حقن الأنسولين في مكان به دهون تكون نسبة امتصاصه كالأتي:

أ- سريع ( ) ب- بطئ ( )

ج- لا يتأثر الامتصاص اذا تم الحقن في مكان به دهون ( )

٢٦/ لتقيل الألم عند حقن الأنسولين يجب:

أ- استخدام إبرة رفيعة ( ) ب- استخدام إبرة قصيرة ( ) ج- كل ما ذكر صحيح ( )

٢٧/ فرك منطقة الحقن يتسبب في:

أ- زيادة سرعة امتصاص الأنسولين (   ) ب- نقصان سرعة امتصاص الأنسولين (

)

ج- لا يتأثر امتصاص الأنسولين بفرك منطقة الحقن (   )

٢٨/ أفضل منطقة لحقن الأنسولين المخلوط في الصباح هي :

أ- عضلة الآلية   (   ) ب- عضلة الفخذ   (   )

ج- عضلة البطن   (   ) د – عضلة اليد   (   )

٢٩/ يجب تغير منطقة الحقن وذلك لتفادي:

أ- بناء الشحوم تحت الجلد (   )   ب. ابيضاض الجلد(   )   ج. كل ما ذكر صحيح   (   )

4. Nurses performance regarding insulin management:
A. Checklist for insulin preparation

Procedure	Done	Not done
1-Wash hand		
2-Gather supplies(insulin-syringe- insulin ,gloves , cotton ball, alcohol wipe)		
3-Check 6 rights of medication administration Right patient Right time Right medication Right rout ,Right dose ,Right documentation.		
4-check insulin expiration and appearance, clear or color.		
5-clean rubber of vial with alcohol.		
6- pull plunger back to pull air into syringe until the tip of plunger is at the line for the number of units required for the dose.		
7-push the needle through the rubber stopper- making sure the tip of the needle is not in the insulin.		
8-press the plunger to push air into the vial of insulin.		
9-turn the vial and syringe upside down so that the top of the needle is in the insulin.		
10-holding the vial with one hand, pull back the plunger to pull insulin into the syringe until has reach the line of the proper dose.		
Total		

B. Check list for technique of insulin injection

Technique	Done	Not done
The lifted skin fold should not be squeezed tightly that it cause skin blanching or pain.		
Insert needle into skin at 90 degree angle.		
Administer therapy.		
Leave the needle in the skin for at least 10 second after the thumb button plunger is fully depressed.		
Withdraw needle from the skin.		
Release lifted skin fold.		
Massaging the site after injection is not generally recommended.		
Total		

Teaching program:

بسم الله الرحمن الرحيم

مرض سكر الأطفال

برنامج اليوم الاول

المحاضرة الاولي

تعريف مرض السكر وكيفية العلاج:

هو مرض يصبح فيه دم الطفل المريض وبوله محتويان علي كميات زائدة من السكر (الجلكوز) مما يسبب للمريض عدد من الأعراض والمضاعفات ان لم يعالج.

جسم الإنسان يمكن تشبيهه بالآلة التي لا تعمل الا بوجود الوقود لإعطاء الطاقة اللازمة ومصدر وقود الإنسان هو الطعام . وعندما نتناول الطعام يتم هضمه بواسطة الأمعاء ويتكون في النهاية سكر الجلوكوز الذي تمتصه الخلايا المبطنة لجدار الامعاء ومنها يتسرب الي مجري الدم ويساعد هرمون الأنسولين الذي تفرزه غدة البنكرياس علي دخول السكر في الدم الي خلايا الجسم للاستفادة منه. واذا حصل هناك خلل في غدة البنكرياس ينتج عن ذلك نقص في الأنسولين وبالتالي يفقد الجسم قدرته علي استهلاك السكر ومن ثم ترتفع نسبته في الدم وبسبب ذلك

يعاني المريض من كثرة التبول والعطش ونقص الوزن وضعف عام الي جانب عدد اخر من المضاعفات واذا استمرت الحالة دون علاج فإنها قد تتطور الي غيبوبة عميقة .

ما هي غدة البنكرياس: هي غدة منشوريه الشكل توجد في اعلي البطن فوق قسم الاثني عشر من الأمعاء الدقيقة وراء المعدة ،وغدة البنكرياس غدة مختلطة تفرز عصارة الهضم . وفي داخل أنسجة غدة البنكرياس جزر لانقرهانس وهي من الغدد الصماء وهي التي تفرز هرمون الأنسولين الذي ينظم عملية استقلاب المادة السكرية.

هل هناك فرق بين سبب مرض السكر عند الأطفال والكبار: نعم – مرض السكر عند الأطفال وغالبا ما يكون النوع الاول المعتمد علي الأنسولين ينتج عن حدوث نقص في مورد الأنسولين اما عند الكبار وغالبيتهم يعانون من النوع الثاني او غير المعتمد علي الأنسولين ولكن يكون هناك نقص في درجة حساسية خلايا الجسم له وبالتالي يبطل مفعوله وهناك اختلافات كثيرة في الأسباب وعلاج الداء بين الكبار والصغار .
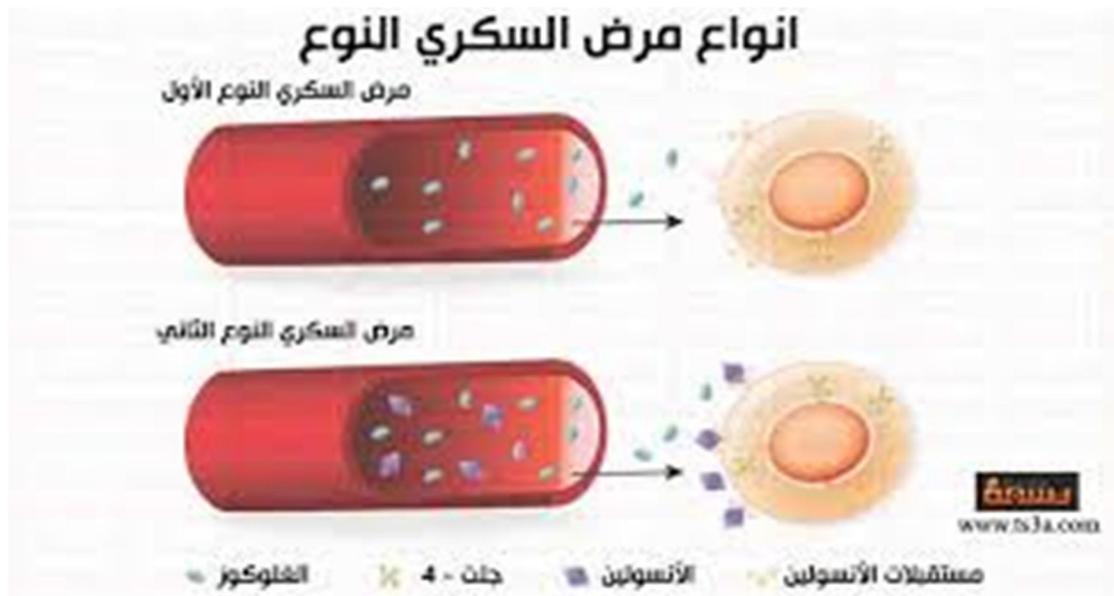
أنواع مرض السكر:

نسبة مرض السكر (النوع الاول)

السكري

90%

10%

النوع الأول

النوع الثاني

سلسلة عن مرض السكري

٢ ماهي انواع مرض السكري؟

النوع الأول

النوع الثاني

المعتَمد على الأنسولين
ويصيب الأطفال

غير المعتَمد على الأنسولين
ويصيب البالغين

@Bntesham

المناعة

البيئة

الوراثة
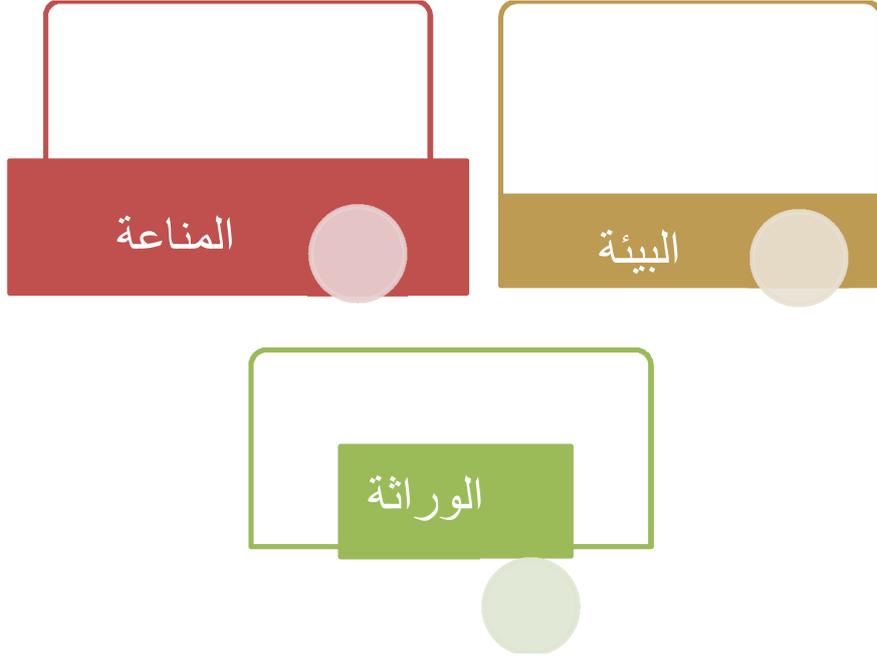
مرض السكر عند الأطفال :

كما ذكرنا سابقا فان أكثر أنواع داء السكر عند الأطفال هو النوع الاول او المعتمد عل الأنسولين ولكن هناك إعداد قليلة من الأطفال يصابون بالنوع الثاني غير المعتمد علي الأنسولين.

ما هي أسباب النوع الاول من السكري؟

يحدث النوع الاول من السكري نتيجة التهاب ومن ثم تليف الخلايا التي تفرز الأنسولين في غدة البنكرياس وهي خلايا لانقرهانس.

وماهي الأسباب التي تؤدي الي التهاب وتليف هذه الخلايا:

ينتج هذا الالتهاب عندما يكون الطفل مهيئا وراثيا ومن ثم يتعرض الي بعض العوامل البيئية ويؤدي ذلك الي افراز الجسم لبعض الأجسام المضادة ضد غدة البنكرياس والتي تؤدي الي التهاب وثم تليف هذه الخلايا.

ما هو دور الوراثة في هذا النوع من السكر:

رغم ان ١٠% فقط من الأطفال المصابين يعطون تاريخ مرض لداء السكر النوع الاول في الأسرة فان الأبحاث قد دلت للوراثة دور هام وبالتالي فان هناك أطفال معرضين وراثيا لهذا المرض ويمكن تحديد ذلك بالكشف علي الكروموسومات ويزداد

احتمال الإصابة بهذا المرض اذا كان هناك افراد اخرين من الاسرة مصابين بهذا المرض مثل الاب والام والاخوان.

ما هي العوامل البيئية التي تؤدي الي الإصابة بمرض السكر:

هنالك عوامل بيئية كثيرة يظن ان لها دور بالإصابة بهذا النوع مثل الفيروسات وايضا تقل نسبة الإصابة بين الأطفال الذين يرضعون من ثدي الام وهنا تكمن تشجيع الامهات علي الرضاعة الطبيعية

ماذا نقصد بالالتهاب المناعي الذاتي:

ان جسم الإنسان يفرز اجسام مضادة لبعض اجزاء الجسم وهي التي تؤدي الي التهابات وتليف الخلايا .. لذلك فان أطفال مرض السكر أيضا معرضون للإصابة بالتهابات في اجزاء اخرى من الجسم كالغدة الدرقية التي يمكنه ان تتضخم وتصاب بالكسل .. وايضا التهابات الغشاء المخاطي للأمعاء التي تنتج عن حساسية لأكل القمح .

الأعراض :

أعراض مرض السكر عند الأطفال

١- كثرة التبول كما وعددا (في حال كون الطفل رضيعا ربما يصعب ملاحظة ذلك خاصة اذا كان يستعمل حفاضته)

(كثرة تغير الحفاضات)

٢-العطش الشديد وشراب الماء بكميات كثيرة

التشخيص:

يعتمد الاطباء في تشخيص هذا المرض علي الاشياء التالية:

١-التاريخ المرضي للحالة وهي الأعراض التي ذكرناها من قبل وفي معظم الحالات تكون الأعراض حادة بمعني انها بدأت في ظرف ايام او اسابيع قليلة.

٢- الكشف السريري علي المريض وربما تكون هنالك أعراض الحامض الكيتوني ونقص الوزن

٣- تحليل الدم للسكر والبول للسكر والاستون.. ويؤكد التشخيص عن طريق تحليل السكر للدم بالطريقة التالية:

اذا كان الطفل يعاني من أعراض مرض السكر التي ذكرت سابقا فان تحليل عينة عشوائية تكفي لتشخيص المرض حيث انه اذا كانت نسبة السكر في الدم ٢٠٠ ملج (١١) ميليمول او اكثر فهذ يؤكد التشخيص.

ب – اما اذا كانت الأعراض غير واضحة فيمكن تأكيد التشخيص.

بطريقتين:

آخذ عينة دم والطفل صائم فاذا كانت النسبة ١٢٦ ملغ(٧) ميليمول هو اكثر فهذا يشير ان الطفل مصاب بالسكري ولكن يجب اعادة التحاليل مرة اخرى للتأكد.

ايضا اذا النسبة تساوي او اكثر من ٢٠٠ ملج (١١ ميليمول) بعد ساعتين من الوجبة او اعطاء جلكوز.. فهذا ايضا يشير الي التشخيص ولكن لابد من اعادة الفحص مرة اخري للتأكد في بعض الحالات.

كيف نعرف اذا كان الطفل مصاب بالنوع الاول (المعتمد علي الأنسولين) او النوع الثاني غير المعتمد علي الأنسولين.

معظم حالات السكر عند الأطفال تكون من النوع الاول وتكون

الأعراض حادة اما في بعض الحالات خاصة اذا كان الطفل مصاب بالسمنة الزائدة وكان هناك تاريخ مرضي في الاسرة فيمكن ان يكون الطفل مصاب بالنوع الثاني..

ويؤكد ذلك التشخيص بقياس نسبة الأنسولين في الدم، ففي حالة النوع الاول تكون النسبة منخفضة اما في حالة النوع الثاني تكون طبيعية او مرتفعة بالإضافة الي بعض التحاليل الأخرى كقياس نسبة الجسام المضادة لغدة لبنكرياس.

المحاضرة الثانية

علاج مرض السكري النوع الاول

علاج النوع الاول:

- يتكون علاج السكري النوع الاول كما يلي:

- حقن الأنسولين

- التغذية الجيدة

- الرياضة

- الاهتمام بحالة المريض النفسية والاجتماعية

- مراقبة وعلاج المضاعفات

- ولتحقيق هذه الأهداف لابد من ان يكون هنالك فريق متكامل من أطباء ،صيادلة ،اختصاصي تغذية ،مرشدة السكر وأخصائية اجتماعية ونفسية وكوادر تمريضية.

تغذية أطفال مرضى السكري: بالإضافة للأنسولين يشكل الغذاء احد اهم الاعمدة الرئيسية لعلاج مرض السكر عند الأطفال .

متطلبات الغذاء الجيد:

- ان يكون الغذاء كافيا لنموء الطفل وان يحتوي علي كل المواد الغذائية كالبروتينات والنشويات والدهنيات والفيتامينات بالإضافة الي السعرات الحرارية المطلوبة لنموء الطفل بصور طبيعية.

- يجب ان يتناول الطفل وجباته الغذائية في اوقات منتظمة

- التعود علي اخذ ثلاثة وجبات رئيسية، وثلاثة وجبات خفيفة بين الوجبات الرئيسية التقليل من تناول المواد السكرية كالحلوى والشكولاته والمشروبات الغازية كالبيبسي كولا.

أغذية مريض السكري:

أفضل 10 أطعمة لمرضى

السكري:
1- الفاصوليا
2- الخضروات الورقية
3- الفواكه الحمضية
4- البطاطا الحلوة
5- التوت
6- الطماطم
7- السمك المشوي
8- الحبوب الكاملة
9- المكسرات
10- منتجات الحليب
منزوع الدسم

المحاضرة الثالثة
الأنسولين وأنواعه

الأنسولين:

الأنسولين هو هرمون تفرزه غدة البنكرياس في الإنسان.

<u>وظيفة الأنسولين:</u>

الأنسولين يساعد السكر (الجلكوز) علي الدخول الي خلايا الجسم المختلفة و بالتالي يستفيد الجسم من مادة الجلكوز كوقود للطاقة ولبناء خلايا الجسم المختلفة بالإضافة الى وظيفته في بناء الجسم من البروتينات والدهنيات.

ماذا يحدث للأنسولين في مرض السكر:

عندما تتليف خلايا بيتا والتي تفرز الأنسولين في غدة البنكرياس فان الغدة لا تستطيع افراز الأنسولين .
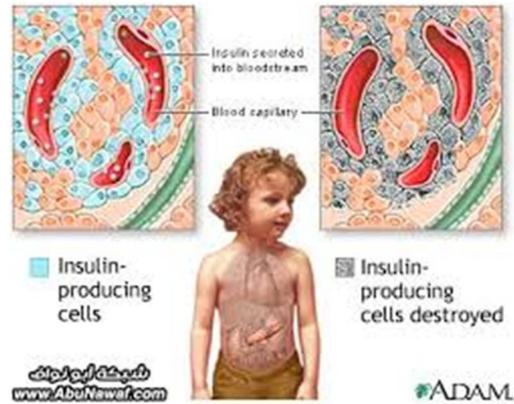
هل هناك بديل للأنسولين الذي يفرز بواسطة البنكرياس عند تعطل الغدة:

ففي الوقت الحالي هنالك أنسولين مشابه لأنسولين الإنسان تماما تم صناعته بتخسير البكتيريا واستعمال الجينات الوراثية للأنسولين ولسنوات طويلة كنا نستعمل الأنسولين المستخرج من البقر والخنزير.

زمن اقصي تأثير بالساعات	زمن التأثير المعتاد بالساعات	زمن الوصول لذروة العمل بالساعات	بداية العمل	مثال تجاري	نوع الأنسولين
٤-٦ ساعات	٣-٤ ساعات	١-١½ ساعة / ½ ساعة	خلال ١٠ - ١٥ دقيقة	هيوما لوق او نوفورايد	سريع المفعول(ليسبرو او اسبارت)
٦-١٠ ساعات	٣-٦ ساعات	٢-٣ ساعات	½ - ١ ساعة	اكترابيد هيوملين ار	قصير المفعول (الصافي)

ما هي انواع الأنسولين الموجودة في السودان الان:

هنالك عدة مستحضرات من الأنسولين وتختلف علي حسب بداية وذروة ومدة مفعولها كما هو موضح في الجدول ادناه:

جدول يوضح انواع الأنسولين ومفعولها:

اكثر انواع الأنسولين استعمالا في السودان في الوقت الحالي هو الأنسولين قصير المفعول(الصافي) ومتوسط المفعول (العكر) او الأنسولين المخلوط.

- **الأنسولين قصير المفعول (الصافي):** وهذا يبدا مفعوله بعد ½- ١ ساعة بعد الحقن ويستمر مفعوله تقريبا من ٣- ٦ ساعات. في العادة يخلط هذا الأنسولين مع النسولين متوسط المفعول قبل حقنه اثناء الجرعات العادية ولك له فوائد مهمة اخرى حيث يمكن حقنه لوحده في حالات ارتفاع السكر وايضا يمكن اعطاءه بالوريد.

ويعطى هذا الأنسولين اسماء تجارية مختلفة علي حسب الشركة المصنعة مثل actrapid Humulin ® ولابد من اقتناء هذا النوع من الأنسولين في المنزل باستمرار لعلاج حالات ارتفاع السكر بالإضافة للجرعات العادية.

- **الأنسولين متوسط المفعول (العكرNPH** : و يبدا مفعوله بعد ٤-٦ ساعات من الحقن ويستمر مفعوله من ١٠- ١٦ ساعة(متوسط ١٢ ساعة) وبالتالي فانه يعطي حوالي مرتين في اليوم... وفي الغالب يعطي بعد خلطه مع الأنسولين

قصير المفعول ، وهنالك اسماء تجارية مختلفة له مثل Insulatard او Humulin – H

- **الأنسولين المخلوط:** وهذا خليط من الأنسولين القصير المفعول والمتوسط المفعول بنسب متفاوتة ولكن اكثر الخلطات شيوعا هو الذي يحتوي علي ٣٠% من الصافي و ٧٠% من العكر ويعطي مثل هذا النوع مرتين في اليوم ، مرة اخرى لابد من الاحتفاظ بالأنسولين الصافي في المنزل للحالات الطارئة اذا كان الطفل يستخدم الأنسولين المخلوط.

- **الأنسولين سريع المفعول:** وهذا النوع من الأنسولين يبدا مفعوله في ظرف ١٠ – ١٥ دقيقة ويستمر مفعوله لمتوسط ٢-٣ ساعات ، يمتاز هذا النوع من الأنسولين بانه يمكن اعطاءه مع الوجبة – او بعد الوجبة مباشرة خاصة في صغار الأطفال اذا لم تكن الام متأكدة ان الطفل سيتناول وجبته. وهنالك اسماء تجارية مختلفة له مثل Novo rapid او Humalog ويمكن ان يعطى بالوريد في الحالات الطارئة او يستعمل في المضخات.

٥ - **الأنسولين طويل المفعول:** هنالك انواع مختلفة من الأنسولين طويل المفعول ولكن احدث هذه الانواع ويمكن استعماله في الأطفال فوق الست سنوات هو ما يسمى بالنسولين قلارقين (Glargine) والاسم التجاري لانتس (Lantus) او Levemir و الاسم التجاري Detemir ويمتاز هذا النوع بانه يبدا مفعوله في ظرف ساعة ويستمر مفعوله لفترة ٢٤ ساعة تقريبا وفي الغالب يعطى مرة واحدة يوميا عند النوم او الصباح ولكن لابد من استعمال أنسولين قصير وسريع المفعول معه قبل كل وجبة رئيسية

يعطى الأنسولين عن طريق الحقن او الأقلام او المضخات: ١ -طريقة الحقن: وهي الطريقة المستخدم في معظم الاحيان.

الأنسولين المجود في السوق هو تركيز ١٠٠ وحدة في كل واحد مل ، والسحب الي خط ١٠ مثلا يعني سحب عشرة وحدات بالحقنة الخاصة لإعطاء الأنسولين.

طريقة الاقلام: هنالك زجاجات خاصة لهذه الاقلام تختلف عن زجاجات الأنسولين العادية، توضع هذه الزجاجات داخل الاقلام بطريقة وضع الرصاص في المسدس،

ثم تحدد الجرعة الطلوبة بواسطة زر معين ومن ثم تعطى الجرعة بواسطة الضغط علي مفتاح اخر، وهذه الأقلام يمكن حملها داخل جيب القميص او الجلابية كالقلم ويسهل من حركة المريض حيث يمكن اخذ الاقلام خارج المنزل دون الاحتياج الي حفظ الأنسولين في الثلج.

طريقة المضخات:

مضخات الأنسولين معظمها في حجم علبة الكبريت او الجوال الصغير وهي خفيفة ولذلك يمكن حملها علي الحزام او الجيب، والمضخة ترسل الأنسولين من خلال انبوبة بلاستيكية مرنة موصلة الي ابرة صغيرة توضع وتثبت تحت الجلد ولابد من تغير الابرة والانبوبة كل ٣ ايام تقريبا . وتعطي المضخة الأنسولين بطريقتين جرعة ثابتة بسرعة ثابتة خلال ٢٤ ساعة ثم يمكن اعطاء جرعات اضافية من الأنسولين قبل كل وجبة عن طريق تشغيل زر معين وتحدد تلك الجرعة بناء علي نتيجة قياس الدم للسكر وايضا عدد السرعات الحرارية التي ستؤكل في كل وجبة وبالتالي اذا اختار الشخص استعمال المضخة فلابد من تحليل الدم للسكر ٤- مرات في اليوم. وتحتاج المضخة الي اشراف من الفريق المعالج للسكر للاتصال بهم لو كانت هنالك مشكلة في أي وقت خلال ال٢٤ ساعة. ودلت الابحاث ان الاشخاص الذين يستخدمون المضخة او يستعملون حقن٤-٦ مرات يوميا تكون نسبة المضاعفات المزمنة عندهم اقل بكثير من اولئك الذين يستعملون ابرتين يوميا.

٤- **الأنسولين عن طريق الاستنشاق:** ما زال في مرحلة البحث بالنسبة للأطفال ولكن النتائج الاولية ادت نتائج جيدة وهو يستعمل كبديل للأنسولين سريع المفعول وقصير المدى

مواضيع حقن الأنسولين: يحقن الأنسولين في اماكن مختلفة في اليدين والرجلين والبطن والفخذين ، ويجب تغير هذه الاماكن بصورة دورية عدا ذلك فانه يحدث ورم دهني او ضمور في اماكن الحقن وفي حالة حدوث التورم الدهني فإننا نتحاشى الحقن في نفس الموضع لمدة شهرين اما في حالة الضمور الدهني فان الأنسولين يحقن حول المنطقة المضمورة.
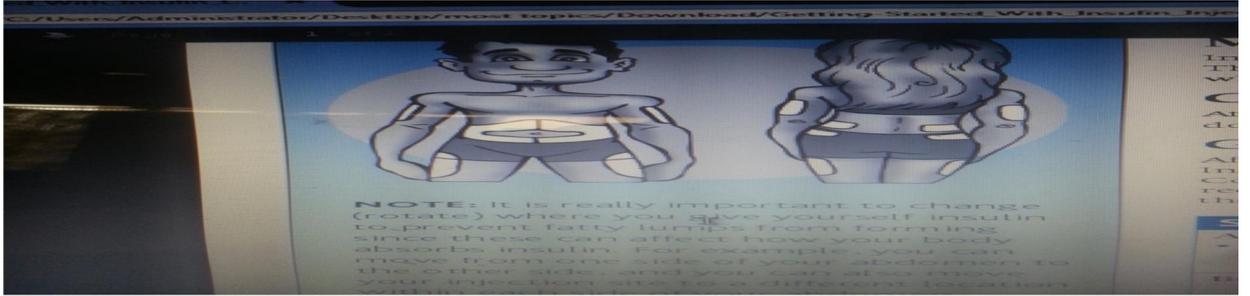
تخزين الأنسولين: يحبذ ان يخزن الأنسولين في الجزء الاسفل من الثلاجة او باب الثلاجة .احذر وضع الأنسولين في قسم الفريزر في الثلاجة (الجزء السفلي). في حالة عدم وجود ثلاجة يمكن وضع الأنسولين في منطقة باردة او رطبة كقرب الزير مثلا بعد وضعه داخل قماش مبتل نظيف او يمكن شراء برمة صغيرة وملئها حتي النصف بالماء ثم ربط عنق الزجاجة الأنسولين بدبارة وتعلق داخل البرمة دون ان تصل الزجاجة الي الماء ، وهذه الطريقة تبعد الضوء وتحفظ الأنسولين في مكان بارد.

مدة صلاحية زجاجة الأنسولين: الزجاجات غير المفتوحة يمكن تخزينها حتي انتهاء الصلاحية المكتوب في صندوق الأنسولين. اما الزجاجات المفتوحة فيمكن وضعها في الثلاجة لفترة ٣٠ يوم بعد الفتح.

برامج تعاطي الأنسولين: هناك برامج مختلفة لإعطاء الأنسولين تتناسب مع مختلف المرضى باختلافات احتياجاتهم وظروفهم وذلك وفقا لمدى سهولة التحكم في تذبذب مستوى الجلكوز ويتأثر ذلك بالوزن والسن والحركة والتغذية والمرض وتنظيم الوجبات.

اكثر البرامج شيوعا هو اعطاء جرعتين يوميا قبل الفطور والعشاء من خليط الأنسولين قصير او سريع المفعول مع متوسط المفعول(اما مخلوطا جاهزا)، ودلت

الابحاث الحديثة اكثرها مفعولا في منع المضاعفات المزمنة فهي التي تعتمد علي اعطاء الأنسولين حوالي اربع مرات يوميا مثلا٣-٤ مرات أنسولين قصير او سريع المفعول قبل الوجبات لوحدها او اعطاء أنسولين طويل المفعول مثل اللانتس او الدتمير واعطاء جرعات صغيرة من الأنسولين سريع او قصير المفعول قبل كل وجبة او استعمال مضخات الأنسولين.

تعطى جرعة الأنسولين حوالي ٢٠-٣٠ دقيقة من الوجبة وذلك لإعطاء وقت للجسم لامتصاص الأنسولين ليكون موجودا بالدم قبل دخول سكر الجلكوز بعد امتصاصه من الامعاء. اما الأنسولين سريع المفعول فيمك اعطاءه قبل الوجبة بحوالي عشرة دقائق او مع او بعد الوجبة مباشرة.

بسم الله الرحمن الرحيم

المحاضرة الرابعة

قواعد إعطاء الأدوية

أوامر الطبيب فيما يتعلق بالأدوية الوصفية:

الطبيب هو الشخص الذي يحدد احتياج المريض لتناول أدوية معينة ويقوم بوصف الدواء اللازم له. وعادة ما تكون الوصفة الطبية مكتوبة.

انواع وصفات الأدوية:

هناك اربعة أنواع من الوصفات الدوائية وهي العاجلة، الجرعة الوحيدة، العادية والتي يتم وصفها عند الضرورة.

امر دوائي عاجل:

وهو الذي يشير الي ضرورة تناول الدواء بصورة فورية لمرة واحدة.

الجرعة الوحيدة:

يتم إعطاءها لدواء يجب تناوله مرة واحدة فقط وفي وقت محدد.

الامر الدوائي اذا احتاج الامر(عند الاحتياج): وهو الذي يسمح للممرض/ الممرضة بإعطائه عندما يري/تري ان المريض يحتاجه،

الأجزاء الأساسية للعلاج الدوائي:

الامر الطبي لإعطاء دواء يتكون من ٦ اجزاء:

١. الاسم الكامل للمريض

٢. تاريخ وصف الدواء

٣. اسم الدواء الذي سيتم تناوله

٤. جرعة الدواء

٥. طريقة التناول

٦. إمضاء الطبيب(التوقيع).

ان إعطاء الدواء هو مسؤولية كبيرة وغالبا ما يتم الاعتمادية عليه لفترات طويلة. فلا يجب ان نقلل من أهمية هذا العمل ، لان الاستعمالات التي تفقد الي الدقة والتركيز قد تؤدي الي تعرض حياة المريض الي الخطر.

سنقوم بعرض النصائح العامة التي يجب ان تؤخذ في الاعتبار عند إعطاء دواء وما الي ذلك كي تتم العملية بسلام.

اعتبارات خاصة بالمريض:

تجنب الأخطاء فما يتعلق بإعطاء الأدوية ، يجب التركيز في العمل الذي نقوم به دون انشغال بأمور اخري.

قبل اعطاء الدواء يجب اولا ان نتعرف علي المريض ونتأكد انه هو الخاضع لهذا العلاج، لأنه هناك بعض المرضي المضربين الذين قد يختلط عليه الامر ويجيبوا علي نداء اسم مريض اخر في محل اسمه.

لا يجب نهائيا ان يتم تسجيل تناول الدواء قبل القيام بإعطائه، يجب ان يقوم / تقوم/ الممرض / الممرضة يستحيل تناول الدواء ، في اقرب وقت ممكن بعد اعطائه مباشرة حتي يتجنب ان يحصل المريض علي جرعة مضاعفة.

اذا اعتقد(اعرب) المريض ان الدواء الذي سيتم اعطائه مختلف عن ذلك الذي يتناوله ، يجب ان نتأكد مما يقوله المريض.

عندما لا يتم تناول الدواء عمدا نتيجة لقيامه بتحليل او نتيجة للصيام ، يجب تدوين هذا الحدث و تسجيله في تقرير المريض الخاص بالأدوية.

يجب الابلاغ الفوري عن اخطاء إعطاء الأدوية او عن إغفال إعطائها.

اذا كان لدي الممرض ادني شك حول احدي الاوامر الطبية بإعطاء دواء ما ، يجب ان يقوم بالاستشارة قبل ان يقوم بإعطاء ذلك الدواء للمريض.

بسم الله الرحمن الرحيم

المحاضرة الخامسة

مضاعفات مرض السكري

المضاعفات سريعة الحدوث:

١.**الهبوط السكري**: هو انخفاض نسبة السكر في الدم الي اقل م ٧٠ مليجرام (٣.٥ مليمول) في كبار الأطفال او اقل من ٨٠ ملجرام في صغار الأطفال و الرضع وفي بعض الأحيان تحدث أعراض انخفاض السكري ازا انخفضت نسبة السكر في الدم بصورة مفاجئة من نسبة عالية مثلا من ٤٠٠ الي ١٠٠ ميلجرام) خطورة انخفاض السكر في الدم: بما ان المخ الإنسان يعتمد علي السكر للتغذية فان انخفاض السكر يؤدي الي الأعراض الخاصة بزلك نتيجة لخلل في وظيفة المخ، وربما تؤدي النوبات المتكررة علي تأثير مزمن في وظيفة خلايا المخ وخاصة عند الأطفال .

ما هي الأسباب التي تؤدي الي انخفاض السكر:

عدم تناول وجبة كافية خاصة بعد اخذ الأنسولين او نتيجة المرض الشعور بالتعب والدوار والام الراس ، اضطرابات في التركيز، فقدان الوعي، الغيبوبة أما الأعراض الناتجة عن وظيفة الجهاز العصبي الودي فتتمثل في العرق وضربات القلب السريعة ، الغثيان، التقيؤ والخوف والرجفة. في حالة عدم العلاج يمكن ان يحدث اغماء او تشنجات بدنية في معظم الحالات يشعر الطفل بالأعراض السابقة قبل التشنجات او الاغماء ولكن في حالات قليلة يمكن ان يحدث اغماء او تشنج دون وجود أعراض اولية كالارتعاش وخفقان القلب.

علاج انخفاض السكر: يجب رفع الجلكوز في الدم عن طريق اطعام المصاب أي شئ يحتوي علي الجلكوز كعصير محلي(اما ملعقة كبيرة في ½ كاس ماء صغير او عصير او عسل) وفي الغالب يتحن الطفل وبعدها يعطي وجبة طعام.

اما اذا دخل الطفل في حالة غيبوبة فيمكن اعطاءه حقنة القلوكاقون وهو هرمون يساعد علي تكسير السكريات المخزنة في الكبد وخروجها الي الدم يقوم بوظيفة عكسية للأنسولين حيث يؤدي الي تحليل مادة الجيلكوجين وهي مخزن السكر في الجسم الي مادة الجلكوز وبالتالي تؤدي الي ارتفاع نسبة السكر في الدم ويبدا مفعول الحقنة في ظرف ١٥-٢٠ دقيقة ، اما في حالة عدم توفر القلوكاقون يمكن مسح عسل او مربة داخل الفم ولكن بحزر من محاولة اعطاء سائل للطفل ان كان في حالة غيبوبة.

الاجراءات الوقائية اللازمة لتفادي الهبوط السكري:

اخذ الوجبات بصورة منتظمة والتأكد من اخذ الوجبة بعد حقن الأنسولين

التأكد من الجرعة الصحيحة للأنسولين قبل الحقن

التأكد من اخذ عصير او سكر عند الخروج من المنزل

اخذ وجبات صغيرة قبل وبعد التمارين الرياضية

تعليم الطفل والاسرة والمدرسة واصدقاء الطفل علي أعراض وعلاج الهبوط السكري

والتأكد من وجود مصدر جلكوز مثل العصير او الحلوى في حقيبة الطفل وفي
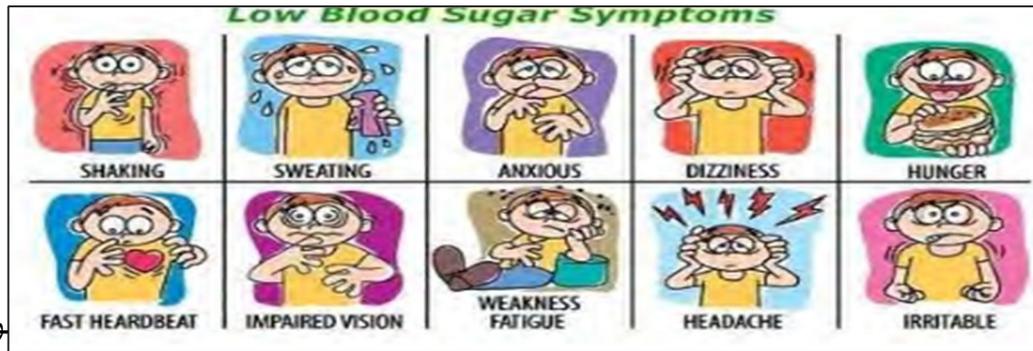
لين(كما في حالات الحمي والالتهابات او عند اخز كميات كبيرة من السكريات والنشويات دون اخز الأنسولين

- أعراض ارتفاع السكر: التبول بكميات كبيرة والشعور بالعطش وجفاف الفم
- الم بالبطن استفراغ

- فقدان الشهية

- القلق

- الشعور بالضعف والهذيان

- ظهور رائحة الاستون في فم المريض

- دوخة، زيادة في معدل التنفس وضيق التنفس

- في حالة عدم الاسعاف يمكن للمريض ان يدخل في حالة غيبوبة وهده من اخطر مضاعا فات السكر

في هذه الحالة يجب فحص البول للأستون والدم للسكر.

○ وعلي ضوء النتائج يمكن عمل الاتي:

- اذا كان نسبة السكر في الدم منخفضة مع وجود استون في البول فيجب اعطاء الطفل وجبة طعام ان تقبلها، اما اذا رفضها فيمكن اعطائه عصير او حليب بسكر او شاي بسكر

- اذا كان ارتفاع السكر في الدم مع وجود ستون طفيف(+) في البول وحالة المريض العامة غير سيئة فيمكن معالجة هذه الحالة في المنزل بإعطاء أنسولين صافي٠.١ وحدة لكل كيلو من وزن المريض واعطاء الطفل سوائل بكميات اكبر

المحاضرة السادسة

٣.الحامض الكيتوني السكري:

تحدث حالة الحامض الكيتوني السكري diabetic ketoacidosis عند مصابي السكر الأطفال ، وسببها هو نقص الأنسولين وارتفاع السكر في الدم، انعدام الأنسولين يتسبب في عدم قدرة خلايا الجسم علي استقلال السكر الموجود في الدم فتبدأ الخلايا بتحليل دهنيات الجسم وعضلاته الي مواد قابلة لاستقلاله كمصدر طلقة ، وتدعي هذه الواد بالكيتونات.

توجد العديد من الاسباب لهذه الحالة ، ومنها تقصير المصاب في اخذ الكمية الكافية من الأنسولين ، او تعرضه لحالة جسمانية معينة، كالخمج، او لحالة نفسية ادت الي رفع معدل السُكر في دمه دون رفع كمية الأنسولين ، مما يؤدي الي اختلال التوازن بينهما.

الأعراض :

تتمثل أعراض الحامض الكيتوني السكري في الالام في منطقة البطن ، التبول الكثير والتقيؤ، التنفس بسرعة وعمق، انبعاث رائحة الفم شبيهة برائحة الاسيتون ،وإصابة المريض بالجفاف نتيجة فقدان السوائل، وفقدان الوعي، وقد تؤدي هذه الحالة الي اضرابات في نظم القلب.

نسبة السكر: نسبة السكر في هذه الحالة تكون مرتفعة تصل الي اعلي من ٢٥٠ ملج/ دل ، وكثيرا ما تقترب من ٤٠٠ ملج/ دل.

العلاج:

عند إصابة المريض بهذه الحالة يجب نقله فورا الي غرفة الطوارئ ويجري الاطباء الفحوصات اللازمة لتحري وجود الكيتونات في بول المريض، ويتضمن العلاج اعطاء الأنسولين عن طريق الوريد بشكل بطئ لتقليل معُدل السكر، واعادة السوائل والالكترونيات التي فقدها المصاب.

ماهي مضاعفات مرض السكري؟
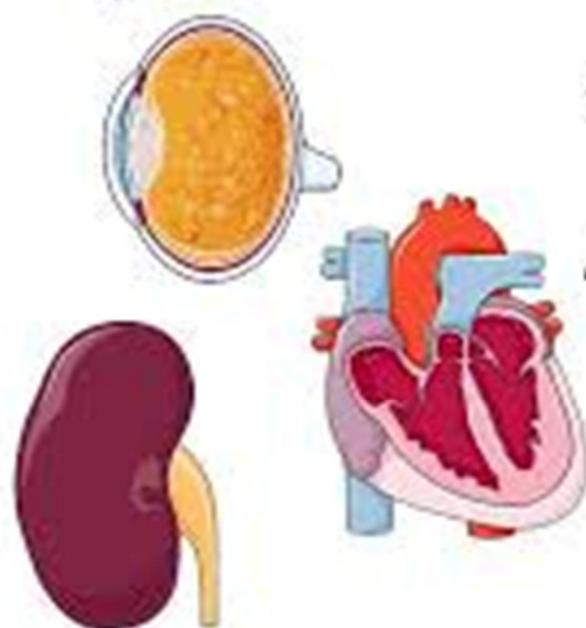
- يسبب الماء الأبيض في عدسة العين ويؤثر على الشبكية.
- التهابات في المسالك البولية والكليتين وقد يؤدي إلى الفشل الكلوي.
- أمراض القلب والدورة الدموية.
- الالتهابات الجلدية المتكررة.

برنامج اليوم الرابع

المحاضرة السابعة

التدريب العملي الأنسولين لتجهيز قبل الحقن/ موديل

الطريقة الصحيحة لتجهيز الأنسولين قبل الحقن:

١- تجهيز المعدات المطلوبة

٢-غسل اليدين جيدا

٣- خلط الأنسولين العكر . الخلط بطريقة الرج مثلا يؤدي الي ظهور فقاقيع هوائية وايضا يقلل من فعالية الأنسولين

٤- تنظيف غطاء الزجاجة بمطهر او ماء نظيف

٥- سحب غطاء الابرة

٦- سحب كمية هواء مساوية لكمية الأنسولين العكر المطلوب او حقن الهواء في زجاجة الأنسولين ثم سحب الابرة

سحب كمية هواء تساوي جرعة الأنسولين قصير المدى (الصافي) وحقنه في زجاجة الأنسولين الصافي، ترك الابرة في مكانها وقلب زجاجة الأنسولين قصير المدى (الصافي) والابرة بداخلها ثم سحب كمية الأنسولين قصير المدى (الصافي) اولا ثم سحب الابرة .

٨- اما في حالة استعمال الأنسولين المخلوط فيجب سحب كمية هواء تساوي جرعة الأنسولين المخلوط ووضعه في الزجاجة ثم تقلب الزجاجة وتسحب كمية الأنسولين المخلوط المطلوبة.

المحاضرة الثامنة

التدريب العملي لحقن الأنسولين / موديل

طريقة حقن الأنسولين بالإبرة: الخطوات التي تتبع لحقن الأنسولين كالاتي:

- نظف مكان الحقن بالماء

- ارفع الجلد بين اصبعين ولا تضغط علي الجلد بشدة

- ادخل الابرة كلها الي تحت الجلد بزاوية ٩٠ درجة، اما اذا كان الشخص ضعيفا فيمكن استعمال زاوية ٤٥ درجة ان وضع الابرة في اتجاه موازي للجلد شيء خاطئ.

- احقن الأنسولين سريعا ولا داعي للمسح الموضعي بعد حقن الأنسولين.

- اترك البرة لمدة حوالي ١٠ ثواني

- اخرج البرة من الجلد

- فك الجلد

- لا داعي لمسح الجلد كما في حالة الحقن بالعضل

- اذا لاحظت نزف بسيط فلا تنزعج ، وايضا اذا كانت هنالك كمية بسيطة من الأنسولين خرجت الي سطح الجلد، اما اذا كانت الكمية كبيرة فيحبذ اعادة تحليل الدم بعد ٢-٤ ساعات ويمكن اخذ جرعة اضافية م الصافي اذا كانت نسبة السكر مرتفعة.

2. Practice

Insulin preparation and administration in kosti teaching hospital

Introduction:

A highly effective strategy in increasing healthcare awareness-associated preparation and administration of insulin in hospitals is through the proper implementation and practice of policies and procedures on insulin injection by healthcare providers committed to this insulin preparation, injection technique and administration.

, when consistently applied and integrated into all systems and processes will yield the desired outcome. i.e. reduced injection error, to identify the areas of injecting insulin, to administer insulin in proper way.

Aim of program; The primary aim of insulin administration program is to prevent error of injection technique, proper preparation of insulin:

thereby assisting health care workers in the provision of quality insulin administration.

Educational objectives: By the end of this program the nurses should be able to:

1. prepare insulin for injection .

2. Know the importance of hand washing .

3. know the 6 rights of medication

4. Application of insulin administration technique .

5. Discuss massaging the site after injection is not generally recommended, check insulin expiration and appearance, clear or color, leave the needle in the skin for at least 10 second after the thumb button plunger is fully depressed

Day one (session 1) :2hours theory from 10am to 12MD .

Learning	Content	Instructional method	Instructional aids	Evaluation
Type 1 diabetes	Definition of type 1& diagnosis	Modified lecture / group work	Poster/ Hand out	

Day one (session2): 1hour theory from 12 mid- day to 1pm.

Learning	Content	Instructional Method	Instructional aids	Evaluation
Type 1 diabetes	Management of type 1 diabetes Insulin Nutrition and exercise	Modified lecture	Poster / hand out	

Day two session one 1hour theory from 12 mid- day to 1pm.

Learning	Content	Instructional method	Instructional aids	Evaluation
Insulin administration	Definition of Insulin, And types of insulin	Modified lecture / Croup work	Posters / hand out	

Learning	Content	Instructional method	Instructional aids	Evaluation
Insulin administration	6 right of medication administration, Routs of medication administration	Group work	Video	

Day two (session2): 1hour theory from 12 mid- day to 1pm.l from 11am to 12MD

Day three(session1): 2 hours theory from 12 mid –day - to 2pm

Learning	Content	Instructional method	Instructional aids	Evaluation
Type1 diabetes	Complication , acute hypoglycemia& hyperglycemia	Modified lecture	hand out	

Day three(session2): 2 hours theory from 12 mid –day - to 2pm

Learning	Content	Instructional method	Instructional aids	Evaluation
Type 1 diabetes	Complication , acute DKA	Modified lecture	hand out	

Day four (session1): 1hour practical from 10 am to 11am

Learning	Content	Instructional Method	Instructional aids	Evaluation
Insulin administration (preparation)	insulin - Preparation .	Modified lectures	Posters , videos and hand out	

Day four (session 2): 1hour practical from 11am to 12MD

Learning	Content	Instructional Method	Instructional Aids	Evaluation
Insulin administration	insulin injection - technique	Group work	Demonstration	

Non-pharmacological Therapy

Medical nutrition therapy

Non-pharmacological Therapy

Physical activity

Pinch-up method

✓ DO   ✗ DON'T
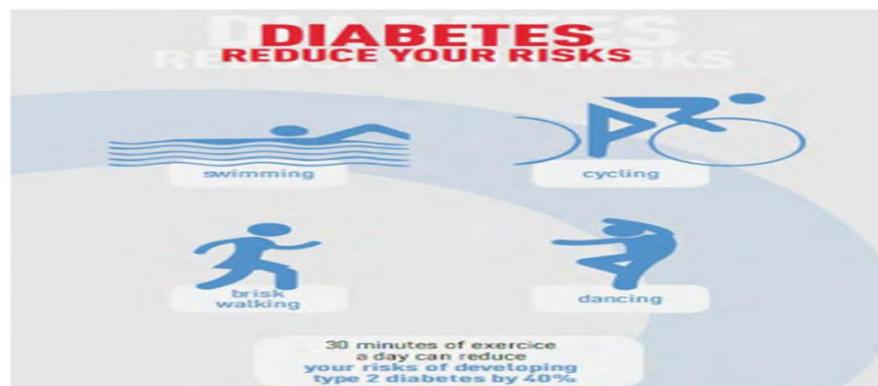
A good pinch-up is performed with only 2 or 3 fingers to avoid taking the muscle from underneath.

Correct pinch-up   Incorrect pinch-up

Insulin Counseling Tips

To inject SC, patient should be instructed to:

- Firmly pinch up the area to be injected and quickly insert the needle perpendicularly (90°) into the center of this area and 45° used for infants and individuals with little SC fat.
- Then, skin pinch is released and insulin is injected.

Rotate injection site within the same anatomic region.

- Recommended to avoid lipodystrophy effect

Abdominal area injection site is the least affected by exercise and the most predictable.

Factors altering SC absorption: site of injection, exercise of injected area, temperature, local massage, smoking, lipohypertrophy, insulin preparation.
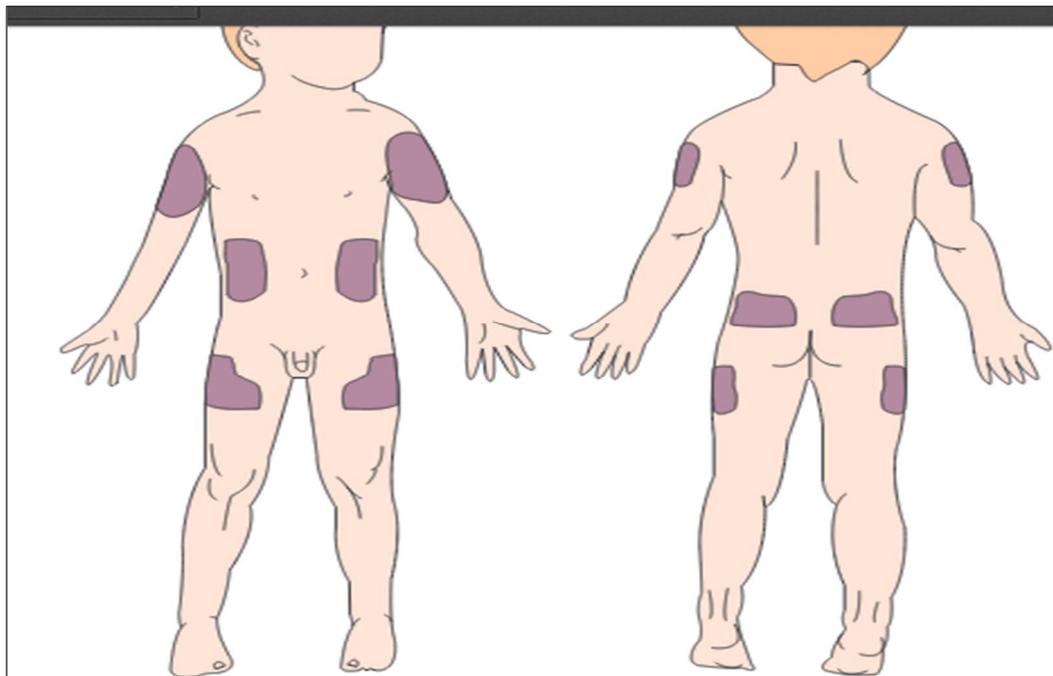
FIGURE 48.5 According to the American Diabetes Association, insulin injection sites in children and adults are the upper outer portions of the arms; the thighs—4 inches below the hip and 4 inches above the knee (adjusted proportionally for children); and the abdominal area just above and just below the waist. The navel and a circular area just around it are excluded as injection sites. In some children, the abdominal area may not be an appropriate injection site.

Acknowledgement

List of abbreviations

Abbreviation	Full words
U.S	United State
IDF	International Diabetic Federation
MENA	Middle East And North Africa
IDDMI	Insulin-Dependent Diabetes Mellitus Susceptibility Type 1
MHC	Major Histocompatibility
HLA	Human Leucocyte Antigen
GADA	Glutamic Acid Decarboxylase Autoantibodies
IA-2	Tyrosine Phosphatase - Like Molecule
ZNT	Zinc Transporter
IAA	Insulin Auto Antibodies
HA1C	Glycated Haemoglobin A1c
PH	Potential Hydrogen
FPG	Fasting Plasma Glucose
2HPG	2 Hours Post Prandial Glucose
OGTT	Oral Glucose Tolerance Test
NHANES	National Health And National Examination Survey
Hb	Hemoglobin
DNA	Deoxyribonucleic Acid
EMP	Enzymatic Modification Of Porcine
I,Z,S	Insulin Zinc Suspension
NPH	Neutral Ph Hagedron
IM	Intramuscular
ADA	American Diabetes Association
DKA	Diabetic Ketoacidosis
IV	Intra-venous
SMBG	Self-Monitoring Blood Glucose
CGM	Continuous Glucose Monitoring System
ACCORD	Action To Control Cardio Vascular Risk In Diabetes
DCCT	Diabetic Control And Complication Trial
EDIC	Epidemiology Of Diabetes International And Complication
BG	Blood Glucose

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Abstract

The national service frame work for diabetes indicate nurses knowledge on insulin dependent diabetes mellitus could be achieved through training and retraining of non – specialized nursing staff on diabetes and insulin administration.

This quasi experimental hospital-based study was aimed at assessing the effect of structured teaching program about type 1 DM & insulin administration on nurse's knowledge. The study was done in Kosti teaching hospital in the period (2013-2018). The sample size was by the total coverage consisted of 63 nurses. The data was collected using predesigned questionnaire & observational check-list. The data was analyzed using statistical package of social science (SPSS).

The present study showed that the nurses had deficient knowledge regarding type 1 diabetes. The nurses were acquired knowledge after intervention specially in relation to etiology, tests used to assess diabetes control and potency of opened insulin vial (82.5%,69.8%,80.9%) respectively. Nurse's skills and technique concerning checking insulin expiry date, cleaning the rubber, lifting the skin and insertion of the needle were poor which were improved during post - test 2 to (87.3%,52.4%,60.3%,98.4%). General performance regarding insulin preparation was improved as the good performance from (3.2%) in pre-test to (61.9%) in post-test2 and skills about insulin administration improved after intervention to good in (55.5%). The study concluded that the knowledge and performance of all study group were improved after intervention. The study recommended organizing training programs to ameliorate the knowledge and skills of nurses on the care of diabetic children and insulin administration.

ملخص الدراسة

مهنة التمريض وضعت جودة الرعاية الصحية وتتمثل في معرفة طبيعة الأمراض ومضاعفاتها وإعطاء الأدوية بالطرق الصحيحة في طبيعة اهتماماتها مع ايلاء اهتمام خاص بالتدريب وتعليم القوة العاملة لديها. عالميا كان المجلس الدولي للتمريض أثبت أن الإلمام بمعرفة حقن الأنسولين أمر أساسي لجودة الرعاية الصحية والتمريض. هدفت هذه الدراسة إلى معرفة تأثير تصميم برنامج للممرضين عن السكري النوع الاول وكيفية حقن الأنسولين وتقييم تأثيره على معرفتهم وأداءه. هذه الدارسة شبة التجريبية بمستشفى كوستي التعليمي في الفترة بين ٢٠١٣- التي ٢٠١٨ تضمنت ثلاثة وستون من الممرضين حيث تم استخدام استبيان وقائمة تحقق لجمع البيانات. تم جمع البيانات لأولية باستخدام الاستبيان ثم تم ملاحظة كل ممرض بواسطة قائمة تحقق أثناء أدائه ثم تم تدريب الممرضين عن السكري النوع الاول وكيفية حقن الأنسولين لمدة ثمانية أسابيع. تم تحليل البيانات باستخدام برنامج التحليل الحزمي للبيانات الحيوية بالحاسوب.

واظهرت النتائج قصورا في معرفة الممرضين عن مرض السكر النوع الاول وحقن الانسولين اما بعد اجراء البرنامج التعليمي فزادت معرفة الممرضين خصوصا فيما يتعلق بأسباب المرض، الفحص الذي يجري لمعرفة التحكم في السكر وفعالية الانسولين بعد فتح فتيل الانسولين وشد الجلد (٨٧.٣%)،(٥٢.٤%)(٦٠.٣%) (٩٨.٤%).

ايضا تحسن اداء الممرضين في تجهيز حقن الانسولين الي (٦١.٩%) اما مهارات حقن الانسولين فتحسنت بنسبة(٥٥.٥%) بعد البرنامج التعليمي الثاني.

لخصت ا الدراسة الي ان معرفة واداء الممرضين تحسن بعد التدخل الدراسي.

اوصت الدراسة بتنظيم برنامج تعليمي لزيادة معرفة ومهارات الممرضين برعاية اطفال السكري و حقن الانسولين.