

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Diabetes mellitus is a chronic condition affecting approximately 285 million people in the world and the figure is expected to rise by more than 50% in the next twenty years (Novatoand Gross,2009).Diabetes mellitus is now one of the most common non-communicable diseases globally. It is the fourth or fifth leading cause of death in most high-income countries and there is substantial evidence that it may be an epidemic in many economically developing and newly industrialized nations (IDF, 2009). Complications from diabetes, such as coronary artery and peripheral vascular disease, stroke, diabetic neuropathy, amputations, renal failure and blindness are resulting in increasing disability, reduced life expectancy and enormous health costs for virtually every society. Diabetes is undoubtedly one of the most challenging health problems in the 21st century (IDF, 2009). Diagnostic investigations done to confirm the disease include blood and urine testing for sugar. Urine is obtained and tested for the odour, colour, gravity and clintext reaction. Blood is also tested for postprandial blood glucose and glucose tolerance (Obasi, 2006).

Types of diabetes

Diabetes occurs when the body cannot produce enough or effectively use insulin (IDF,2009). Insulin is a hormone which is manufactured in the pancreas, the insulin levels in blood vary with the amount of glucose present in the blood.

Diabetes is a condition that makes it difficult for the cells of the body to get adequate amount of glucose (Obasi, 2006). There are two types of diabetes mellitus these are type 1 and type 2 diabetes mellitus (IDF 2012). type 1 diabetes (insulin dependent diabetes mellitus) (IDDM) is a category of diabetes that occurs mainly in children and young adults, though it can come on at any age (Obasi, 2006). These patients urine contains sugars and acetones, they also need insulin injection every day to control the glucose levels in the blood and prevent ketoacidosis (IDF, 2011).

The patients are usually of normal or less than normal weight and majority of them develop severe symptoms of disease acutely over a period of several weeks or months and if treatment with insulin is withheld, they rapidly develop ketoacidosis hence it is known as insulin dependent diabetes mellitus. The availability of insulin to metabolize carbohydrates is also insufficient and this may be caused by; failure of insulin production which may be due to islets of langerhans disorder (Obasi, 2006). Type 1 diabetes mellitus accounts for only about 5–10% of all cases of diabetes; however, its incidence continues to increase worldwide and it has serious short-term and long-term implications such as metabolic syndrome, diabetic retinopathy and diabetic neuropathy (Novato et al., 2007).

Type 2 diabetes (Noninsulin dependent diabetes Mellitus) (NIDDM) is a form of diabetes that appears in the middle aged or elderly people and symptoms may be absent or mild. In women pruritus vulva is common, thirst and polyuria develop gradually. The urine contains sugar but not acetone (Obasi, 2006). The patients are often obese and must comply to a low carbohydrate diet in order to lose weight. In most cases once the

typical weight has been normal, the blood sugar levels go back to normal and no sugar can be established in the urine (Graue et al., 2004). However, oral hypoglycaemic drugs are used in patients who are not over weight and who do not respond to dietary restriction. Insulin is usually detected in nearly all patients in this category and they are therefore less prone to develop ketosis (Obasi, 2006).

Type 2 diabetes mellitus (T2DM) is also becoming increasingly common in children, and one of the reasons for this could be rising childhood obesity rates. Despite recent increases in Type 2 diabetes mellitus (T2DM), Type 1 diabetes mellitus (T1DM) still account for roughly 90% of diabetes in children were as the majority of diabetes in adults is T2DM. Diabetes in the young present challenges beyond those involved with management of the disease in adults (Novato and Gross, 2009). Early appearance of diabetes presents an increased risk of complications that include cardiovascular disease nephropathy, neuropathy, amputation, and retinopathy (IDF, 2009). The average annual increase is more rapid in younger children (4.0% in 0-4 years old) compared to older children (2.1% in 10-14 year olds). Psychosocial issues associated with diabetes also have much greater impact in children and youths (Novato and Gross, 2009).

Type 1 diabetes regional prevalence rates

The International Diabetes Federation (IDF) 2011 stipulates that, in Africa 75% of people with diabetes are undiagnosed and Europe has the highest prevalence of type 1 diabetes in children, Middle east and north Africa has 6 of the top 10 countries by diabetes prevalence, North America and Caribbean 1 adult in 10 has diabetes, South and central America has 12.3% of all deaths which were due to diabetes, South-east Asia;

almost one-fifth of the world's people with diabetes live in just seven countries, in Western Pacific; 132 million adults have diabetes, the largest number of any region (IDF, 2011).

Sub-Sahara African prevalence rates

While there has been a great improvement in the knowledge epidemiology and management of diabetes in the developed worlds, there has been little or no improvement in sub-Saharan Africa. The true burden of this disease is not even known but a difference in the pattern and outcome of diabetes mellitus type 1 (DMT1) in children in the sub-Saharan Africa compared to the western world seems to be Present (IDF, 2011). Moreover much of the available data on prevalence is limited for making generalization about diabetes in children of sub-Saharan Africa (Majaliwa et al., 2008).

The children in sub-Saharan region with type 1 diabetes often go undiagnosed. Even if diagnosed few have accessed insulin, syringes and monitoring equipment and most of them die in the process. This early mortality plays a significant role in the low prevalence rate of type 1 diabetes in the region (IDF, 2011). Studies in sub-Saharan Africa continue to confirm that, it is the low-and middle-income countries (LMICs) that face the greatest burden of diabetes (IDF, 2011).

Zambian prevalence

Baren et al. (2005) indicates that there are few detailed studies on diabetes in Zambia. Baren et al. (2005) further postulate that estimates of prevalence and prognosis in Zambia was estimated at that of 12.0 per hundred populations. These figures compare

with estimates of type 1 diabetes mellitus prevalence by the International Diabetes Federation of 4.8 per hundred thousand. However, the higher priority of diabetes care in national health care planning in Zambia maybe attributed in part, to the active advocacy and educational role played by Diabetic Association of Zambia (DAZ).

The international diabetes federation further estimates the prevalence of diabetes in Zambia at 3.1% globally and that diabetic retinopathy is responsible for 4.8% of all blindness (Kaseba, 2012).

Causes of diabetes

Diabetes is not a contagious disease and the causes of diabetes are unknown but there are predisposing factors that include obesity, heredity, infection like pancreatitis, malignant neoplasms of the pancreas and pancreatotomy (Obasi, 2006). A number of studies describing the possible causes of diabetes over the last 20 years have been done (IDF, 2011). Diabetes is caused by a relative or absolute insulin deficiency, a hormone produced by the pancreas. Lack of insulin absolute or relative affects metabolism or breaking down of carbohydrates, protein, fat, water and electrolytes leading to an accumulation of sugar in the blood (Novato et al., 2007).

Deference between type 1 and type 2 diabetes

Type 1 diabetes mellitus is a condition where the pancreas may not make enough insulin to unlock the receptors in the body; glucose cannot enter the cells therefore glucose levels increase in the blood. (Obasi, 2006). Type 1 diabetes is also called insulin dependent diabetes mellitus (IDDM). It may be that the beta cells have been damaged by

a viral infection. In type 1 diabetes, the persons own body destroy the insulin-producing beta cells in the pancreas and the body produces little or no insulin (Novato et al.,2007).It has a hereditary tendency that leads to beta cell degeneration. The usual onset of type 1 diabetes is around the age of 12 and is sometimes called juvenile diabetes (IDF, 2011).

It may develop very abruptly over a period of a few days or weeks and shows itself with increased blood glucose with sudden loss of weight.

In contrast to type 1 diabetes, people with type 2 diabetes are not dependent on exogenous insulin and are not ketosis-prone, but may require insulin for control of hyperglycaemia if this is not achieved with diet alone or with oral hypoglycaemic agents (IDF, 2011).In the case of diabetes type 2, much of its onset is the result of body weight, fitness and lifestyle. Type 2 diabetes use insulin injections if their diabetes cannot be controlled. (Free medical dictionary 2012). This type of diabetes tends to appear later on in life (Medical news today, 2012). This form of diabetes is also called noninsulin dependent diabetes mellitus (NIDDM) (Free medical dictionary, 2012).

Pathogenesis, Aetiology and Symptoms of Diabetes Mellitus type 1

Research indicates that observed chances of getting type one diabetes are 36% in identical twins, 10% in siblings and 1% if parents have IDDM (Obasi, 2006). Pathogenesis of IDDM is precipitated by environmental factors in a genetically susceptible individual and damage to cells is autoimmune mediated. Type 1 diabetes is a condition in which pancreatic cell destruction usually leads to absolute insulin

deficiency. Insulin directly regulates the rate of carbohydrates metabolism and directly influences fat and protein metabolism (Daneman, 2006).

Consequently insulin deficiencies due to beta cell damage result into overwhelming stress and inevitably triggers a chain reaction of unwanted events. First of all insulin is not conveyed from the extra cellular fluid into the intracellular compartment (Obasi, 2006). Without glucose, the cells become deficient in energy to oxidize fats and protein. The energy is then drawn from adipose tissue and muscles store. The resultant breakdown of fat or protein causes tissue wasting and fat breakdown. Glucose which is locked outside the cells without the insulin begins to accumulate and eventually raise the blood sugar level (hyperglycaemia) (Court et al., 2009).

The elevated blood sugar (which exerts a strong osmotic force) pulls cellular water in the blood, which results into cellular dehydration. As the blood sugar level rises, glucose eventually spills into the urine causing glycosuria. The osmotic pull of glucose without urine prevents reabsorption of water within the kidney tubules, causing extra cellular dehydration (Obasi, 2006).

Finally these pathological developments results in cardinal symptoms of diabetes, such as Weight loss, tissue wasting, Polyuria due to non reabsorption of water by the renal tubules as a result of the osmotic activity of glucose Polyphagia which results from the inability of the body to use ingested glucose. There may be failing vision, pain in the legs due to diabetes neuropathy or to peripheral vascular diseases and infection of the skin (Obasi, 2006). Other long term symptoms of the disease are puritus vulva in female

patients due to infection by fungi which thrive on the glucose deposit from the urine. In male patients there may be inflammation of the prepuce and glans penis, recurrent infection such as boils or carbuncles. There may be tissue necrosis, chronic ulceration of the foot, loss of the energy and drowsiness which leads to hyperglycemic shock from which patients cannot be aroused by ordinary stimuli (Obasi, 2006).

Diabetes and adolescents

World health organisation (WHO) defines “adolescents” as individuals in the 10-19 years age group and “youth” as the 15-24 years age group. These two overlapping age groups are combined in the group “young people” covering the age range 10-24 years (Butner, 2009). Adolescence is a time when children and their parents work toward a new type of relationship as adolescents experience socio-emotional and cognitive development (Steinberg & Silk, cited in Butner, 2009). As a consequence, adolescents and parents frequently view the family and their relationship in discrepant ways. A key parent- child discrepancy involves views of adolescents’ competence and independence in diabetes self-care that include glucose testing, insulin injections and exercise. Children and mothers report experiencing stressful events around issues of poor metabolic control.

Adolescents may find diabetes to be stressful. A child or teenager who is newly diagnosed with diabetes may have a range of reactions and emotions. Some common reactions that are often experienced by both the child and their parents include shock, denial, anger, sadness, fear and guilt (Gavin & Wysocki, cited in Butner, 2009). The stigma of feeling ‘different’ embarrassment about telling friends, coping with the

emotional reaction of family members, coping with constant parental questions about their diet, how they are feeling and whether or not they have taken their insulin may make adolescents react negatively towards people around them (Cameron et al., 2007).

Diabetes can affect an adolescent's emotions both directly and indirectly. Poorly controlled blood sugar can directly affect the emotions by causing behaviour changes, such as irritability. Adolescents with diabetes have an increased risk of depression and anxiety, which may be why many diabetes specialists include a social worker or psychologist as part of their diabetes care team.

Research findings suggest that social anxiety is common in general populations of adolescents (Battista et al., 2009). This may interfere with behavioural and quality of life among adolescents with type 1 diabetes mellitus. Treatment of social anxiety may result in better compliance and increased quality of life however; pushing adolescents too hard to autonomy may lead to serious problems and adolescents who assume diabetes responsibilities too soon face an increased risk of problems with treatment adherence, poor metabolic control and intermittent hospitalizations (Frank, 2005).

Moving toward independence from their parents, adolescents typically want to make their own choices and have a sense of control over their lives. Having a disease may make them feel powerless and they try to gain control by not taking medications, missing appointments or not following dietary restrictions (Health information, 2012). Sometimes, the parents may have developed an overprotective parenting style, which

can delay the teen's ability to take responsibility for his or her treatment or cause frustration for the adolescent. Thus, low compliance can be a way of confronting the authority of parents and professionals (Taddeo, 2008). Adolescents in particular, may have a particularly hard time dealing with diabetes. A child who has been very good about sticking to his or her diabetes regime may rebel in the teen years by ignoring his or her diabetes care plan.

Adolescents may also have a harder time telling friends or boyfriends or girlfriends that they have diabetes because they want to fit in. Adolescents with diabetes tend to ignore their vulnerability to potential consequences of their disease in their age appropriate preoccupation with the present (Gutharie, 2003). They may also experiment with drugs or alcohol, behaviours that can be even more dangerous for someone with diabetes. Eating disorders and forgetting insulin doses are other problems that can occur more often in the adolescent years (Health information, 2012).

Information from the Diabetes Association of Zambia Lusaka: Interview conducted with Raymond Ng'onga on 13th March, 2012 at Diabetes Association of Zambia University Teaching Hospital (UTH) Lusaka.

Diabetes Association of Zambia coordinator indicated that most of the adolescents do not have much support from their caregivers because this group of people is given the autonomy to care for themselves, leading to compromise with compliance. Most of the adolescents from high social economic status are taken to private clinics and only come to UTH diabetes care unit when they develop hypoglycaemic episodes that are subsequently not easily controlled.

Health education on diabetes in general can be accessed from the diabetic centre implying that those who do not enrol at the centre do not access information on how to care for themselves hence compromising the quality of life.

The government does not provide any grant to the centre making it difficult for the qualified staff to follow up patients and provide health care and psychological health education to improve their quality of life. UTH collaborates with the diabetes association of Zambia in helping to improve quality of life and compliance among diabetic adolescents and other diabetic patients in general. The association does not have enough expertise to provide the service and also diabetic centres are few in Zambia where screening of diabetes is done. Diabetic patients in Lusaka urban travel long distances coming to UTH because it is the only screening point. This has led to misdiagnosis in the clinics because of lack of specialised professionals and poor management leading to challenges in compliance and later improvement of their quality of life and this may lead to death. It is against this background that the impetus to investigate the relationship between compliance and quality of life is promulgated.

Psychological factors associated to adolescents with diabetes mellitus type 1 on Treatment compliance

Many children and adolescents are unable to cope emotionally with their condition. Diabetes causes them embarrassment, results in discrimination and limits social relationships (Lewin et al., 2006). Metabolic control deteriorates in adolescents when

compared with children and adults. This can be explained by the physiological changes, insulin resistance and compliance problems that occur with puberty which seem to be high in adolescence (Frank, 2005). The psychological factors that account for poor treatment compliance is best understood within the context of normal adolescent development. Experimentation rebellion and risk taking are often associated with the adolescent' struggle for control of their destiny. This is a challenging time for adolescents, parents and health professionals (Frank, 2005).

Adolescents experience serious psychological problems, such as depression, eating disorder and recurrent ketoacidosis due to insulin omission which may be due to maladaptive coping strategies. Treatment compliance among adolescents with type 1 diabetes mellitus is low in 50% of diabetic teenagers and this is becoming a social and medical problem (Frank, 2005).

Research findings indicate that children with type one diabetes mellitus are at higher risk for continued adjustment difficulties. There is growing evidence particularly from North America that adolescents appear to have a greater incidence of psychiatric disorders (Majaliwa et al., 2008).

Importance of compliance

According to the world health organization, non-compliance with long term medication for a condition such as diabetes is a common problem that leads to diabetes complications and serious economic consequences in terms of wasted time, money, and uncured disease (Cramer et al., 2007).

Diabetes is a progressive disease that can lead to a significant number of health complications and profoundly reduce quality of life. Many diabetic patients work to manage the health complications with diet and exercise; they also require medications to improve abnormal and uncontrolled blood glucose levels (Obasi, 2006).

Adolescents often learn to be more compliant in medication usage, diet and exercise programmes. Compliance helps the diabetes patients understand fully the degree to which their non compliance to diet medication and exercise impact their long term health. Compliance is the number one factor that determines a healthy outcome in the diabetic patient (Cadena, 2007). Compliance also help patients to take control of their situations with focus on maintaining emotional and physical health. Noncompliance with diabetes treatment regime can lead to life threatening complications (Novato and Gross, 2009).

1.2 Study justification

The study is important for a number of reasons. There is little research conducted on diabetes mellitus type 1 among adolescents in Zambia. Frank 2005 indicate that the psychological factors that account for poor treatment compliance is best understood within the context of normal adolescent development and changing demands of the disease that may lead to poor quality of life. Metabolic control also deteriorates in adolescents when compared with children and adults. This can be explained by the physiological changes, insulin resistance and compliance problems that occur with puberty which seem to be high in adolescence. Furthermore, hypoglycaemia is the most common complication of type 1 diabetes in childhood that may lead to death (Obasi,

2006). Additionally the study will establish the relationship between compliance and quality of life among adolescents with type 1 diabetes mellitus. It will also help review the factors affecting compliance among adolescents with type 1 diabetes mellitus. Furthermore the study will provide more insights on the psychological effects of compliance among adolescents with diabetes mellitus type 1 using the compliance scale and how these in turn affect other areas of their lives such as self-management of the condition to enhance quality of life. It will be of value to the psychologists and health workers on management of diabetes mellitus type 1. It will help psychologists in working out strategies that will help lives of adolescents by enhancing psychological intervention programmes for adolescents with type 1 diabetes mellitus to enhance their quality of life. The policy makers may utilise the information in the Health system to reduce the disease burden vis-a-vis diabetes mellitus type 1.

1.3Theoretical framework

Conceptual framework central to this research is the concept of diabetes self-management. The process of self-management has been conceptualized and operationalized in various ways. Several terms have been used to describe self-management, such as self-regulation, self-control, and self-care (Creer& Holroyd, 1997 (in Kent, 2011)). The concept of self-management as described by Creer and Holroyd 1997 in Kent, 2011) will be used in this study. Self-management refers to those processes that enable individuals to guide goal-directed activities over time and across settings (Creer& Holroyd in Kent, 2011). Self-management activities in diabetes have the goal of preventing long-term complications but require daily self-directed activities (Ryan &Sawin, 2009 in Kent, 2011). When individuals participate in self-management

activities, they control and are responsible for the management of their chronic conditions. Self-management requires the individuals to have knowledge about their condition and believe in their self-efficacy skills to manage a chronic disease or engage in healthy behaviors (Ryan & Sawin in Kent, 2011). For individuals with chronic medical conditions, successful self-management leads to improved health outcomes and improved quality of life. The conceptual model shown in Figure 1 forms the theoretical framework for this study.

The main variables to be examined in this study are: compliance and quality of life. A summary of these research variables and the tools used to measure them is presented in Chapter II.

In order to thoroughly explore the major constructs of diabetes compliance, quality of life was also explored. The variables in this framework were carefully selected to comprehensively examine compliance and quality of life. Figure 1 below shows the study's theoretical framework which indicates that compliance to diabetes treatment results into better quality of life among adolescents with diabetes mellitus type 1 which includes correct insulin intake according to the doctor's prescription, exercises, correct diet and hypoglycemic control.

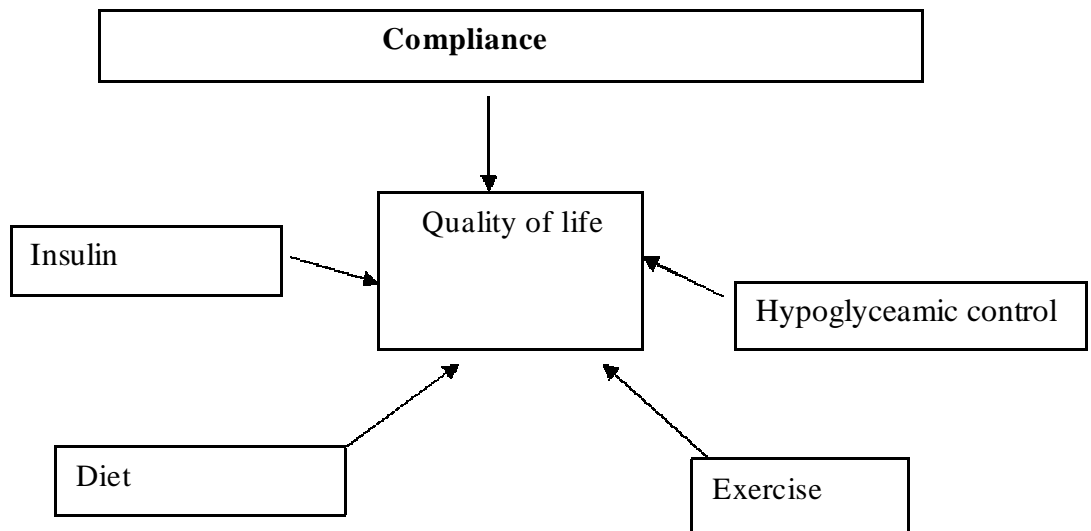


Figure: 1 Theoretical Frame work

1.4 Statement of the problem

A growing body of literature shows that worldwide there is an increase in the number of deaths related to diabetes complications. Among adolescents, the most prevalent problem is diabetes mellitus type 1. Zambia has its share of this problem although it has been one of those non-communicable medical conditions that have been ignored for a long time. As an acknowledgement of the problem in Zambia, the Government has created a special unit in UTH for it.

Adolescents with type 1 diabetes are faced with complex developmental changes as well as changing demands of the disease that lead to poor metabolic control and lower degree diabetes-related quality of life (Graue et al., 2004). Adolescents may struggle to incorporate a medical condition into their evolving sense of self associated with psychological consequences such as depression, stress and eating disorders

Frank,2007).This may appear to psychologists as denial of the illness and failure to recognize the seriousness of the illness. Denial of the problem may lead to low compliance with diabetic treatment recommendations that include diet, exercise, insulin administration and Hypoglycaemic control (Taddeo, 2008).

World Health Organization (WHO)has identified non-compliance with long term medication for a condition such as diabetes is a common problem that leads to further complications and disease. Noncompliance to treatment recommendations leads to complications such as retinopathy (Obasi, 2006). According to information from the diabetic association of Zambia UTH, in Zambia most adolescents rarely go for medical check-ups for screening purposes and therefore rarely are those affected aware that they have the problem. This can also be blamed on lack of public education on the problem. Research indicates that Treatment compliance among adolescents with type 1 diabetes mellitus is estimated to be as low as 50% of diabetic adolescents.Because of lack of research data, psychological factors that account for poor compliance are generally unknown.

Evidence shows that little research has been done on the dynamics of compliance in medical treatment in Zambia to inform policy directions aimed at improving quality of life of those affected by the problem.

Therefore, this study aimed at filling in the gaps in literature as well as make recommendations regarding the state of compliance among adolescents with diabetes mellitus type 1 with the view of enhancing it.

1.5 Research Objectives

General Objective

The main objective of the study was to establish whether there was a relationship between compliance and quality of life among adolescents with type 1 diabetes mellitus.

Specific Objectives

The specific objectives of the study were to:

- 1 Explore the impact of an information giving intervention on compliance and quality of life.
- 2 To explore the factors related to compliance among adolescents with diabetes mellitus type 1.
- 3 To explore the effect of compliance on the quality of life of the adolescents with type 1 diabetes mellitus.

1.6 Research questions

1. What is the impact of information giving intervention on compliance among adolescents with diabetes mellitus type 1?
2. How does compliance affect quality of life of adolescents with Diabetes Mellitus type 1?
3. What factors affect compliance among adolescents with Diabetes Mellitus type 1?

1.7 Research Hypotheses

The following research hypothesis guided the study

1. At follow up period, the intervention group will have better quality of life than the control group.

2. At follow up period, the compliance levels in the intervention group will be higher than in the control group.
3. There will be a significant positive correlation between compliance and quality of life among adolescents with diabetes mellitus type1.

1.8 Variables

Table 1: Operational definitions

Independent variable	Operational definition	Measuring instrument
Compliance	Determined by insulin, diet, exercise and hypoglycaemic control that involve frequency of insulin intake, type of food intake as advised by doctor ,time and frequency of exercise and clinical history of diabetes episodes	The rating scale for compliance
<i>Dependent variable:</i> Quality of life	Impact of diabetes, Worries about diabetes, Satisfaction with life.	Diabetes quality of life scale modified for youths)
<i>Other variables:</i> Gender	Male or Female	SocialDemographic Questionnaire
Age	16-19years	Social Demographic Questionnaire

CHAPTER TWO

2.0 LITERATURE REVIEW

Presented here is a review of relevant studies that have previously been carried out in an attempt to investigate the relationship between compliance and quality of life among adolescents with type 1 diabetes mellitus. The studies cited here are sourced from diabetic association of Zambia UTH, various journals such as health journals, books and International diabetic Atlases. The key terms used when searching for literature is compliance quality of life and diabetes mellitus type 1 and 2.

2.1 Effects of compliance on quality of life

A widely investigated phenomenon in literature is Quality of life (QoL), defined as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns (Novato et al., 2009). QoL assessment permits assessing the impact of Type 1 diabetes mellitus (T1DM) and treatment strategies that will serve to support disease management and therapy compliance. Surveying factors that can influence the QoL of adolescents with T1DM has provided support for a better understanding of access to the mechanisms involved in treatment compliance, with a view to greater wellbeing and adequate metabolic control (Novato et al., 2009). Poor metabolic control and lower degree diabetes-related quality of life are associated with greater use of emotion focused coping in adolescents with type 1 diabetes. Adolescents with type 1 diabetes are faced with a complex set of developmental changes as well as changing demands of the

disease hence adjustment problems might affect both psychological wellbeing and the course of the disease by contributing to poor self management and poor metabolic control (Baren et al., 2005).

2.2 Compliance among diabetic adolescents

Kyangas(2000) conducted a study to find out effects of compliance among 300 adolescents aged 13 to 17 years with diabetes mellitus type 1. The results showed that only about one fifth (19 %)of the respondents with diabetes felt that they complied fully with the health regimes whereas 75% placed themselves in the category of satisfactory compliance and the remaining 6% reported poor compliance.

Compliance with home monitoring was poorest: only 25% said they fully complied with the home monitoring instructions and 51% showed poor home monitoring compliance. The highest degree of compliance was reported for insulin treatment with 81% of the patients ranking in the top category. Some statistically significant relationships between the degree of compliance and the background variables such as the duration of the disease, exercise, smoking, alcohol intake and serum glycosylated haemoglobin (GHbA1c) value were found.

In this study good compliance was explained on good motivation, a strong sense of normality, energy and will power, support from parents , physicians and nurses, a positive attitude towards the disease and its treatment with no threat to one's social wellbeing and fears of complications (Kyangas, 2000). The findings of this study show

some factors that contribute to compliance among adolescents with type 1 diabetes mellitus.

Regardless of advances in the perception of T1DM and its management, the regime remains multifaceted and time consuming which can create compliance to treatment not easy. Several cross sectional studies include revealed comparatively high rates of non compliance in children and adolescents with T1DM. In a study of 74 children ages 11-16, researchers found 49% of children who did not adhere to their insulin and diet recommendations, 75% of youths failed to complete prescribed blood glucose tests, and 64% did not follow through with exercise recommendations (Patton, 2006).

Research has uncovered a number of barriers to treatment (lifestyles or personal belief that may prevent or inhibit treatment compliance) in adolescents with T1DM, including behavioural factors (e.g. poor planning, not having the needed supplies like syringes and needles), cognitive factors (e.g. discomfort or embarrassment, poor problem solving, limited knowledge and fear), and environmental factors (e.g. limited time, no one to assist or supervise diabetes management insurance problems) (Patton, 2006). This indicates that knowledge on compliance is not sufficient for adolescents and the behavioural factors which have been found to predict lower adherence rates include high levels of family stress, poor social coping and problem solving, and inappropriate levels of child responsibility in diabetes management. This is important to this study because the study involves adolescents who are still under the care of parents or significant caregivers in the families who are involved in the care. These people have to remind and encourage the adolescents to take their medications and control their diet according to

medical prescription. Therefore, the parental behaviour towards the adolescents including knowledge on diabetes with regards to peer interaction has an impact on compliance among adolescents.

2.3 Factors of compliance, metabolic control, and quality of Life

A research was conducted in a hospital and 157 volunteer participants aged 10-18 years old took part in the study. The 157 participants were all patients from a diabetes paediatric unit. Descriptive statistics were conducted to determine the rate of compliance and metabolic control in the sample. A series of partial correlations for age, gender overall and compliance was predicted by family social support, Diabetes duration and social class. None of the family variables predicted metabolic control. Quality of life was predicted by family social support. A path analysis confirmed that family social support moderated the relationship between compliance and metabolic control. While the correlation between compliance and metabolic control was positive, regardless of the level of family social support, when family social support was very high, the correlation between compliance and metabolic control was stronger than when family social support was low. Since gender and social class were significant predictors of compliance, metabolic control, and quality of life, a regression analysis was run by gender and by social class. The results showed that quality of life was predicted by family social support for both males and females ($p < .001$), and overall ($p < .001$) accounted for 11% of the total variance. For the females, family support accounted for 16% of the variance, but for the males it accounted only for 6% of the variance. Only among the lower-class participants was family support ($p < .001$) predictive of quality of life, and it accounted for 16% of the variance. For the upper-class participants, family conflict was

significantly predictive of quality of life ($p < .01$), accounting for 23% of the variance, and for the middle class participants, family organization predicted quality of life ($p < .05$), accounting for 12% of the variance. The metabolic control was predicted by high social class and finally compliance was predicted by family social support in females and by lower social class (Pereira et al., 2008).

The above study also shows that compliance to glycaemia control was quite high, problems reported, were associated to diet, one of the most difficult aspects in diabetes management. In terms of physical exercise, participants were enrolled in physical exercise activities further than the required gym classes. The results on compliance to treatment were in agreement with the literature that shows patients having improved compliance to the health aspects of diabetes treatment that include insulin administration and glycaemia control (Pereira et al., 2008).

Research indicates that the progressive autonomy for self-care and peer pressure to join in junk food is common among older adolescents and may explain the increased resistance to compliance. The results show the significance of reaching out to the families of high-risk adolescent with diabetes mellitus type 1. The above study shows that there was interdependence between family variables and the patients' compliance to treatment, metabolic control, and quality of life. In fact, higher family social support predicts higher compliance and higher quality of life. On the other hand, higher family conflict predicts lower quality of life (Lewin et al., 2006).

The studies further indicate that family conflict predicted diminished quality of life for the adolescents. Diabetes duration predicted compliance and metabolic control this means that, the longer the disease, the lower the metabolic control and compliance (Pereira et al., 2008). Those adolescents who have diabetes for a longer period of time, normally, are also the oldest and they demonstrate as a result of their pursuit for autonomy, less compliance with treatment and lower metabolic control. Male and female adolescents showed some similarities and some differences in terms of the influence of family variables on diabetes management. For both groups, increased family social support predicted an improved quality of life. For the females, increased family support also predicted an improvement in compliance than in men.

2.4 Quality of life and hypoglycaemia episodes

Hypoglycaemia is the most common complication of type 1 diabetes in childhood. Hypoglycaemia is usually defined as a blood glucose level less than 70 milligrams per litre of blood (<70 mg/dL) (3.9 mmol/L) (Obasi, 2006). Thus poor compliance to insulin treatment and specifically missing shots might contribute to poor metabolic control and episodes of ketoacidosis. Hypoglycaemia is associated with a reduction in quality-of-life, increased fear and anxiety, reduced productivity, and increased healthcare costs.

The clinical goal in the treatment of diabetes is to achieve good glycemic control resulting in an improvement in quality-of-life for the patient (Fidler et al., 2011). Therefore, metabolic control among adolescents with diabetes mellitus type 1 is very cardinal in order to avoid intermittent hypoglycaemic episodes that may lead to death.

2.5 Coping and perception of adolescent's quality of life

A research was conducted where 116 adolescents with type 1 diabetes mellitus aged 13 to 18 years participated in the study. The participants completed a questionnaire to obtain information on coping styles and perception of diabetes-specific quality of life. .

The results indicated that there was a significant correlation between higher glycosylated haemoglobin (HbA1c) values and high degree of mental and behavioural disengagement and aggressive coping. Greater use of active coping ($p < 0.05$) was significantly related to a decrease in HbA1c. Partial correlation analysis showed that lower scores on diabetes specific quality of life were significantly related to greater use of emotional focused coping. Stepwise multiple regression analysis showed that greater use of mental disengagement was significantly related to lower degree of perceived diabetes related impact. Significantly related poor metabolic control and lower degree diabetes-related quality of life were associated with greater use of emotion focused coping in adolescents with type 1 diabetes (Graue et al., 2004).

Adolescents with type 1 diabetes are faced with a complex set of developmental changes as well as changing demands of the disease. Adjustment problems might affect both psychological wellbeing and the course of the disease by contributing to poor self management and poor metabolic control, where as coping skills are crucial for emotional and social development among adolescents in general with diabetes faced with additional demands. Adolescents may struggle to incorporate a medical condition into their evolving sense of self, which may appear to clinicians as denial of the illness, failure to recognize the seriousness of an illness or low compliance with treatment recommendations hence the relationship to quality of life (Novato and Gross, 2009).

2. 6 Psychological factors associated to adolescents with treatment compliance

The psychological and behavioural changes that typically accompany adolescence often culminate in a lack of compliance with treatment and a deterioration of blood glucose control that can be frustrating for the teenager, his or her family and/or the healthcare provider. Feelings of anger, sadness, frustration, and helplessness may further complicate continued compliance and blood glucose control (Cara, 2008).

Research indicates that adolescents have not yet fully developed risk assessment skills, impulse control of organisational abilities. Adolescence is a time for development of self concept and identity. “Who am I” is a fundamental question teens struggle with, and the development of a medical condition during these formative years can derail this process (Taddeo, 2008). The psychological and behavioural changes that typically accompany adolescence often culminate in a lack of compliance with treatment and a deterioration of blood glucose control that can be frustrating for the teenager, his or her family and/or the healthcare provider. Feelings of anger, sadness, frustration, and helplessness may further complicate continued compliance and blood glucose control (Cara, 2008).

Adolescents experience serious psychological problems, such as depression, eating disorder and recurrent ketoacidosis due to Insulin omission which may be maladaptive coping strategy that lead to treatment compliance among patients with type 1 diabetes mellitus to as low as 50% of diabetic adolescents becoming a social and medical problem (Frank, 2005).

A non experimental study of 61 diabetic teenagers was conducted to determine psychosocial factors associated to treatment compliance. The number of blood glucose

determinations socioeconomic level and practice of sport was measured. Psychological tests were applied to analyse self efficiency, motivation of achievement, self esteem and knowledge of the illness and its treatment (Ortiz, 2005). As a measure of patient compliance, glucosilated haemoglobin (HB1Ac) was measured. Results showed that Six patients had a good control of diabetes ($HB1Ac < 7\%$), 24 had HB1Ac values between 7 and 8.9 and 31 had value of 9% or more, considered as a poor diabetes control. The intensified insulin treatment scheme, the knowledge of the illness and its treatment and the sense of self efficiency were the factors associated with better compliance with treatment (Ortiz, 2005).

Research indicates that initial adjustment to diabetes is characterized by sadness, anxiety, withdrawal, and dependency, adolescents develop a clinical adjustment disorder in the 3 months after diagnosis. Such difficulties often resolve within the first year, but poor adaptation in this initial phase places children at risk for later psychological difficulties Cameroon (2007).

Teenagers of higher socio economical levels had a better compliance with treatment. However, 50% of diabetic adolescents in this sample had a poor control of the disease and the variable knowledge about the disease is the better predictor of patient compliance (Ortiz, 2005). Compliance and metabolic control deteriorates in adolescents when compared with children and adults (Frank, 2005).

This can be explained by the physiological changes and insulin resistance that occur with puberty due to physiological resistance and compliance problems that seem to be

high in adolescence. The psychological factors that account for poor compliance is best understood within the context of normal adolescent development. Experimentation rebellion and risk taking is often associated with adolescents' struggle for control of their destiny. This is a challenging time for adolescents, parents and health professionals.

2.7 Improving compliance

Dietary control is one of the important measures to success in management of diabetes mellitus type 1 (Obasi, 2006). Some of the goals in the nutritional management of diabetes include, Exercise which plays an important role in the treatment of diabetes mellitus and it helps to promote metabolism and utilization of carbohydrates, therefore reducing the amount of insulin requirement in the body. Reasonable uniformity in the amount of exercise done from day to day should be emphasised. Hypoglycaemic control that involves insulin administration is important in order to avoid diabetic complications (Battista et al., 2008). Studies indicate that knowledge on improving compliance enhances satisfaction, help improve compliance to treatment and acceptance as adolescents with diabetes mellitus type 1 continue living (Dlamater, 2006).

Baumann and Deak, (2000) postulate that compliance has the main influence on quality of metabolic control of diabetes mellitus type 1 and prognosis in the course of illness. Studies show that lack of information as the main reason for non compliance. Therefore knowledge on compliance will help reduce the higher levels of stress and maladaptive coping associated with compliance problems such as anxiety, depression and eating disorders that bring about worse diabetic management in adolescents (Delamater, 2006).

Diabetes can interfere with normal psychological and social development and complicate family functioning. Diabetes is a lifelong disease and psychological intervention is important including diabetic education. Diabetes leads to a change of lifelong habits and often unwelcome restrictions, Natural and normal reactions include fear, denial, anger, depression, bewilderment, frequent blood glucose monitoring and insulin treatment management (Obasi, 2006).

2.8 Conclusion

From the findings of the various research studies, it can be proposed that compliance among adolescent with diabetes mellitus type 1 seem to have an effect on the quality of life. Hence there is need to understand the pattern of such effects among the Zambian population in this study in relation to the rating scale for diabetes and diabetes quality of life scale for youths results and interpretation. Literature indicates that hypoglycaemia is associated with a reduction in quality-of-life, increased fear and anxiety, reduced productivity, and increased healthcare costs. Therefore, poor compliance to insulin treatment and specifically missing shots might contribute to poor metabolic control and episodes of ketoacidosis (Obasi, 2006).

CHAPTER THREE

3.0 METHODOLOGY

This chapter focused on the methods that were used to evaluate the effects of an information giving intervention among adolescents with type 1 diabetes mellitus. Studies have indicated that knowledge on compliance has the main influence on metabolic control and prognosis in the course of the illness Cara (2008). The aim of the study was to establish the relationship between compliance and quality of life among adolescents with type 1 diabetes mellitus.

3.1 Study design

This study was a randomised control trial, with a wait list control, those who did not receive intervention during the study, but were offered after the study period. The study utilised a cross sectional study design and data was collected from participants aged 16 to 19 years. The participants were assessed using the Rating Scale for Compliance (appendix 5), authored by Clark & Goosen (2005). This scale tested adolescents using four factors namely insulin, diet, exercise and hypoglycaemic episodes, these determined the frequency of insulin intake, taking recommended food, time and frequency of exercise and clinical history of diabetes episodes. Additionally, the Diabetes Quality of Life Rating Scale (appendix 6), authored by Jacobson et al., (1988) designed for youths was used to assess the impact of diabetes, worries about diabetes, satisfaction with life.

3.2 Study setting

This study was conducted at Diabetes Association of Zambia Centre (DAZ) at the University Teaching Hospital (UTH) Lusaka. Permission from DAZ was given to the researcher to carry out the study in the centre. The researcher chose DAZ because the association provides counselling, testing for blood sugar by medical personnel, treatment facilities for diabetic individuals, and also provides support to individuals with diabetes. DAZ had 250 adolescents registered as members in the association as of March 2012.

3.3 Study population

The sample was drawn from urban Lusaka district at UTH Diabetes Association of Zambia centre records. These adolescents were those who come for treatment in UTH, who were members of the diabetic association of Zambia. The study comprised of 40 adolescents with diabetes mellitus type 1 who were diagnosed within the past 6 months at the time of recruitment, this criteria was used because they were adjusting to their condition. This figure was based on the number of adolescents who had come to enrol at the Diabetes Association of Zambia. Information from the DAZ (dated 13th March, 2012) was that in a week a minimum of 3 adolescents enrolled in the association, meaning that in 6 months an average of 72 adolescents enrolled in the association.

3.4 Study sample

A total of 40 adolescents with diabetes mellitus type 1 were recruited in the study. The sample was in the age range of 16 to 19. According to the World Health Organisation (WHO) adolescents are individuals between 10 and 19 years old. This age range was

chosen because literature shows that there is lack of compliance among adolescents with diabetes mellitus type 1.

Adolescents are also capable of responding to the questionnaires easily. They are able to discuss once asked to do so and are able to follow instructions as regard the study. On the other hand adolescence is a time of turmoil, especially for individuals with diabetes (Cara, 2010).

Research indicates that adolescents do not want to be different from their peers, which can lead to denial or hiding their illness from peers, thus making compliance very difficult (Cara, 2010). Hence this study may help to improve their compliance and quality of life.

These adolescents were drawn from DAZ records and they were at least able to write and were literate in English. (This was determined from their demographic information)

3.5 Recruitment

The diabetes association of Zambia records was used as a guide to the target population and age distribution. Using this guide, participants were recruited with the help of Diabetes Association of Zambia staff. With permission from the Diabetes Association of Zambia (DAZ) in UTH Lusaka, the study was explained to the coordinator and further found out information on adolescents ranging from 16 to 19 years old with Insulin dependent Diabetes Mellitus (IDDM) from the records.

A random method was used in the study to select the 40 participants from the records who later belonged to the intervention group and the control group. A list of eligible participants from the DAZ records in alphabetical order in the age range from 16-19 years old was written. The researcher then randomly selected 40 participants and then divided them into 2 groups based on gender. The gender groups were then grouped according to age groups of 16-17 and 18-19 years old. From each age group the researcher randomized equal numbers of adolescents into intervention and control group. The first names bearing even numbers from each age group were assigned to the intervention group and the names bearing odd numbers to the control group. Refer to figure 2 below (recruitment flow chart).

All the 40 adolescents were subjected to baseline assessment (pre-assessment) followed by intervention on 20 adolescents and subsequently, at (follow up) post assessment on the 40 adolescents was conducted.

Figure 2: Recruitment flow chart

List of eligible participants from DAZ records in alphabetical order in age group of 16-19 years.

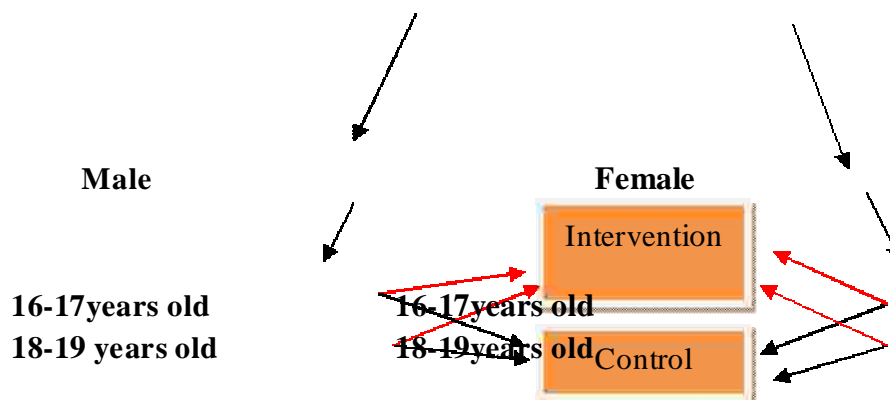
↓
Randomly choose the first 40 participants bearing even numbers from the list.

↓
List the 40 participants based on gender

↙ ↘

Male **Female**

↓
Group the gender groups based on age i.e., **16-17** and **18-19** year olds



From each age group the researcher randomised equal number of adolescents into intervention and control group (the first names bearing even numbers from each age group were considered in the intervention group and the names bearing odd numbers in the control group).Note: Despite attempting to match gender, the study was not aimed at analysing this variable.

3.6Intervention procedure

Time 1

(Week 1)

The baseline measures for intervention and control group was done, where the 40 adolescents answered the demographic questionnaire, quality of life scale modified for youths and the rating scale for compliance and the effects of compliance and quality of life among the adolescents was explored.

Intervention

(Week 2 to week 9)

The researcher was with the intervention group and had 1 meeting with them once in a week.

Time 2

(Week 10)

Follow up measure (same used at time 1 with intervention and control group) was done. The researcher met both groups at the Diabetes Association of Zambia Centre in UTH. The participants were asked to complete the demographic questionnaire, rating scale for compliance and the diabetes quality of life scale modified for youths which explored the effects of compliance among the adolescents in the study. These questionnaires were

completed one after the other in both baseline intervention and follow up (post assessment). Instructions were read to them before they started answering each questionnaire in a plenary setup.

3.7 Intervention

The eight weeks intervention with the researcher involved, 1 meeting once a week for 1 hour, reviewing group rules, giving information on diabetes, compliance and quality of life, discussing issues on diabetes and participating in participant initiated discussions. Group activities were done that involved free interaction time which is non competitive and snack time with the help of the Diabetes Association of Zambia staff members. The researcher gave information on Diabetes mellitus type 1 using a school information booklet for teachers entitled: You, Me and Diabetes, authored by (De Jong & Bennink, 2006). (See appendix 7). This information booklet contained information on the importance of diet, exercise, and taking the prescribed treatment. The researcher talked through the different parts of the booklet with the participants and discussions were stimulated on issues arising. The participants were also given a leaflet on recommended diet to take home and read at their convenience and/or discuss with parents/caregivers. Any questions on diet regarding the leaflet were discussed in the meetings. The staffs from DAZ who are also medical practitioners were involved in answering questions on diet, exercises and taking of prescribed treatment. After the end of the intervention period, the researcher interacted and gave the same information to the control group separately in order to help them enhance compliance and improve their quality of life.

3.8 Measures

Instruments used by the researcher at both pre intervention and post intervention periods included: Social demographic questionnaire, the rating scale for compliance and Diabetes Quality of Life Scale modified for youths (DQOL) (see appendix 6). Diabetes Quality of Life Measure (DQOL) has 39 questions to be answered by the participants. The DQOL measure was developed toward patients with insulin-dependent diabetes mellitus. The DQOL was authored by (Jacobson et al., 1988). It was designed using primarily young adults and adolescents. Three subscales measure diabetes impact, worries about diabetes, and satisfaction with life. However, having been designed for a younger population, including a high percentage of adolescents, many of the items are not appropriate for elderly populations (Jacobson et al., 1988). The rating scale for compliance consists of behavioural, attitudinal, and lifestyle components that include time at which insulin is taken, units of insulin, delay in meal timings, any exercise and hypoglycaemic episodes. It was derived from a review of the relevant literature and from focus groups that included the Doctors and other clinicians at the diabetes clinics; it was authored by Clark & Goosen (2005). The other assessment tool included the demographic questionnaire; this is a questionnaire that brought out personal information for each participant designed by the researcher. The researcher used the above scientific questionnaires namely the Diabetes quality of life scale and the rating scale for compliance because they were used before under the project of efficacy of behavioural intervention for diabetes mellitus type 1 in UTH Lusaka, at the Diabetes association of Zambia (DAZ).

3.9 Inclusion and exclusion criteria:

Inclusion criteria involve adolescents:

1. Aged between 16 to 19 years, this information was obtained using the demographic questionnaire.
2. With educational level which varied (from secondary to tertiary), able to write and speak English.
3. Members of DAZ
4. Those who had diabetes mellitus type 1 diagnosed within six months.

Exclusion criteria involved adolescents ;

1. Those who were sick at the time of the study
2. Those who did not consent

3.10 Ethical consideration

The researcher obtained permission from UTH to conduct the study that involved respect for the respondent's right to self determination, privacy, anonymity, confidentiality, fair treatment, and protection from harm and discomfort. The adolescents were also given transport allowance and refreshments for each intervention visit at the diabetes association of Zambia in UTH. This is because these adolescents were coming from different places to take part in the intervention study. Permission for the study was also given by the Chairperson of the University of Zambia Social Sciences Ethics Committee. Permission was obtained from the study site. Approval was obtained from Research Ethics committee, University of Zambia.

Self determination

The right to self determination was based on the ethical principle of respect for persons and indicated that people were capable of controlling their own destiny (Burns & Grove,

2003).The respondents right to self-determination was ensured by researchers explanation on the purpose and significance of the study to them, obtaining their informed consent, emphasising that participation was free and voluntary and that they had the right to withdraw from the study without any negative consequences. In addition, the adolescents were informed that the study did not involve any type of payments to any participant, except the transport allowance to attend the intervention sessions.

Privacy, confidentiality and anonymity

Privacy is the freedom an individual has to determine the time, extent and general circumstances under which private information would be shared with or withheld from others (Burns & Grove, 2003).The respondents' anonymity and confidentiality was assured by using the codes instead of their names hence no information was linked to specific respondents. Furthermore the confidentiality was guaranteed through the storing of the filled in data collection tools in a safe and locked place and only researcher and research supervisor had access to the data collected.

Anonymity

The participants remained anonymous throughout the study even to the researcher; hence the participants were advised not to put their names when answering on the questionnaires.

Benefits to participants

Long term benefits are that participants with diabetes mellitus type 1 will be able to improve their wellbeing following the advice from the doctor/medical officer/nurse on diet, taking medicines, exercises etc.

Risks to participants

The study did not involve any risk to participants except that participants spent more time than usual at UTH Diabetes Association of Zambia and this made them tired. Participants were provided with appropriate refreshments. Participants were also allowed to have short breaks whenever required. This study helped participants to have information on diabetes mellitus type 1 and it also helped the researcher to get more information that can be used to help young people with similar condition.

Data management

All questionnaires were stored in a lockable cupboard in a locked office accessible only by the researcher and research supervisor. Final data was communicated to the supervisor. Both participants in the intervention and control groups had equal rights to information of which the control group was attended to later after the intervention group.

3.11 Data analysis

Descriptive analysis was used to obtain means for the independent and dependent variables using scientific package for Social Sciences (SPSS) 16.0 for windows. Mann Whitney U test was used to explore the impact of an information giving intervention,

effects of compliance on the daily living of adolescents with type 1 diabetes mellitus and the factors related to compliance were also explored. The bivariate correlation coefficient was also done to test the hypothesis that there was a positive correlation between compliance and quality of life among adolescents with diabetes mellitus type 1. The demographic characteristics of adolescents were also analysed using descriptive analysis.

CHAPTER FOUR

4.0 FINDINGS

4.1 Introduction

This chapter presents the findings of the study. The focus of the study was to measure the compliance levels among adolescents with diabetes mellitus type 1 and their quality of life. The study explored the demographic characteristics of adolescents aged 16 to 19 years using descriptive analysis.

The data were measured by use of self report instruments namely; rating scale for compliance, quality of life scale for youths and social demographic questionnaire. All the 40 adolescents were subjected to baseline assessment (pre-assessment) followed by intervention on 20 adolescents, and subsequently, a (follow up) post assessment on the 40 adolescents was conducted.

These questionnaires facilitated the measurement of the participants' compliance levels and quality of life of adolescents with diabetes mellitus type 1 in the baseline and follow-up groups. These data tools were then analyzed for difference on compliance levels and quality of life among adolescents with diabetes mellitus type 1.

4.2.1 Participants in the study

4.3.1 Demographic characteristics of the participants

The study had a sample size of 40 adolescents with diabetes mellitus type 1. Fourty questionnaires were distributed to the sample in UTH diabetes association of Zambia. The background information about the participants descriptions of demographic characteristics of the sampled adolescents are presented in tables below.

Table 2 below shows that; in the control group 11 (27.5%) adolescents were males while 9 (22.5%) were females. In the intervention group 11 (27.5%) adolescents were males and 9 (22.5%) were females. With regard to age; the control group had 7(17.5%) adolescents aged 16-17 years and 13 (32.5%) adolescents aged 18-19 years. While the intervention group had 7(17.5%) adolescents aged 16-17 and 13 (32.5%) adolescents aged 18-19 years.

Table 2: Distribution of participants by group, gender and age

Gender	Male		Female		Total	
	n	Percent	n	Percent	N	Percent
Control group	11	27.5	9	22.5	20	50
Intervention group	11	27.5	9	22.5	20	50
Total	22	55	18	45	40	100
Age						
	16-17	Percent	18-19	Percent	N	Percent
Control group	7	17.5	13	32.5	20	50
Intervention group	7	17.5	13	32.5	20	50
Total	14	35	26	65	40	100

The educational level in table 3 below shows that adolescents in the control group had 2(5%) adolescents who were between grade 0-7; 5(12.5%) were between grade 8-10;

12(30%) were between grade 11-12 and 1(2.5%) was in college. In the intervention group 3(7.5%) adolescents were between grade 0-7; 4(10%) were between grade 8-10; 12(30%) were between grade 11-12 and 1(2.5%) were in college.

Table 3: Distribution of participants by group, educational level

	Grade 0-7		Grade 8-10		Grade 11-12		College		Total	
	n	Percent	N	Percent	n	Percent	n	Percent	n	Percent
Control group	2	5	5	12.5	12	30	1	2.5	20	50
Intervention group	3	7.5	4	10	12	30	1	2.5	20	50
Total	5	12.5	9	22.5	24	60	2	5	40	100

The type of guardians in table 4 below shows that; in the control group 5(12.5%) adolescents lived with the mother only and 2(5%) lived with the father; 8(20%) lived with both the father and the mother and 5(2.5%) lived with neither the father nor the mother. While in the intervention group 5(12.5%) lived with the mother; 3(7.5%) lived with the father; 7(17.5%) lived with both the mother and the father and 5(12.5%) neither lived with the mother nor the father.

Table 4: Distribution of participants by group, type of guardian

	Mother		Father		Both mother & father		Neither father nor mother		Total	
	n	Percent	n	Percent	n	Percent	n	Percent	N	Percent
control	5	12.5	2	5	8	20	5	12.5	20	50

group										
intervention group	5	12.5	3	7.5	7	17.5	5	12.5	20	50
Total	10	25	5	12.5	15	37.5	10	25	40	100

The table 5 below shows prevalence of diabetes in the family; the control group 15(37.5%) adolescents indicated that diabetes was not common in their family; 3 (7.5%) adolescents indicated that it was not very common; 1(2.5%) adolescents indicated that diabetes was moderately in their family and 1(2.5%) adolescents indicated that it was very common. While the intervention group shows that 15(37.5%) adolescents indicated that diabetes was not common in their family; 3 (7.5%) adolescents indicated that it was not very common; 1(2.5%) adolescents indicated that diabetes was moderately in their family and 1(2.5%) adolescents indicated that it was very common.

Table 5: Distribution of participants by group, prevalence of diabetes in the family

	Not common		Not very common		Moderate		Very common		Total	
	n	percent	N	Percent	n	Percent	n	Percent	N	percent
Control group	15	37.5	3	7.5	1	2.5	1	2.5	20	50
Intervention group	15	37.5	6	7.5	2	2.5	2	2.5	20	50
Total	30	75.0	9	15	3	5	3	5	40	100

4.4.1 Compliance to treatment

The individual items of compliance scales were analyzed using descriptive statistics in order that participants responses are shown with their specific responses to scales of compliance, this gives a summary of findings on the levels of compliance to treatment between the control and intervention groups at baseline and follow up. These responses suggest the levels of

compliance for each scale indicated including the total number of participants that attempted to respond to a particular item. The items measured for compliance included: time at which insulin is taken, units of insulin, delay in meal timings, and lapse in diet, physical exercises and hypoglycemic episodes. Before looking at the total score for compliance for the control and intervention group at the two time points (baseline and follow up), a descriptive analysis was carried out on each item of the scale to look at the trend for compliance.

Time at which insulin is taken in table 6 below indicates that; at baseline 11(55%) participants in the control group indicated that insulin was not taken on time in more than three occasions while in the intervention group 18(90%) participants indicated that more than three occasion's insulin was not taken on time. At follow up time 15 (75%) participants in the control group indicated that they took insulin on time on all days while 20 (100%) participants in the intervention group also indicated that they took insulin on time on all days. These results show that a large number of adolescents in the follow up intervention group took insulin on time on all the days compared to the control group. Therefore this is an indication that compliance levels improved among adolescents after the information giving intervention in the follow up intervention group.

Table 6:Frequency of change in time at which insulin is taken made by control and intervention groups during the last 7 days.

Baseline		Frequency	Percent
control group	taken on time on all days	2	10.0
	not taken on time on at least two occasions	1	5.0
	at least three occasions on which insulin is not taken on time	6	30.0
	more than three occasions when insulin is not taken on time	11	55.0
	Total	20	100.0
intervention group	not taken on time on at least two occasions	1	5.0
	at least three occasions on which insulin is not taken on time	1	5.0
	more than three occasions when insulin is not taken on time	18	90.0
	Total	20	100.0
Follow up			
control group	taken on time on all days	15	75.0
	not taken on time on at least two occasions	3	15.0
	at least three occasions on which insulin is not taken on time	2	10.0
	Total	20	100.0
intervention group	taken on time on all days	20	100.0

The units of insulin change in table 7 below shows that; at baseline 11 (55%) participants in the control group indicated that more than three times a change was made in a prescribed dosage while 18 (90%) participants in the intervention group indicated that more than three times a change is made in a prescribed dosage. At follow up time 11

(55%) participants in the control group indicated that they made no change to insulin dosage other than the allowed dosage while 20 (100%) participants in the intervention group indicated that they made no change to the insulin dosage other than allowed dosage. These results suggest that the adolescents in the follow up intervention group made no change to their insulin dosage other than what the doctor would make. They complied to the treatment that was given to them without making any change of their own hence all the adolescents appreciated following doctors prescriptions leading to high compliance to insulin.

Table 7: Frequency of change in units of insulin made by control and intervention groups during the last 7 days

Baseline		Frequency	Percent
control group	no change made by the patient other than allowed dosage	1	5.0
	once but more than the prescribed dosage	2	10.0
	two three times a change is made	6	30.0
	more than three times a change is made in a prescribed dosage	11	55.0
	Total	20	100.0
intervention group	once but more than the prescribed dosage	1	5.0
	two three times a change is made	1	5.0
	more than three times a change is made in a prescribed dosage	18	90.0
	Total	20	100.0
Follow up			
control group	no change made by the patient other than allowed dosage	11	55.0
	once but more than the prescribed dosage	7	35.0
	two three times a change is made	2	10.0
	Total	20	100.0
intervention group	no change made by the patient other than allowed dosage	20	100.0

Delay in meal timings in table 8 below show that; at baseline 11 (75%) participants in the control group indicated that they had three occasions when meals were not on time but less than five occasions while 18 (90%) participants in the intervention group

indicated that their meals were delayed for more seven days. At follow up time 9 (45%) participants in the control group indicated that they had all their meals on time or not more than three meals delayed while 20 (100%). participants in the intervention group indicated that they had all the meals on time or not more than three meals delayed.

These results suggest that adolescents in the follow up intervention group appreciated taking their meals on time because they learnt the importance of taking meals on time to maintain their energies during intervention. Therefore all the adolescents in the follow up intervention group had high compliance to taking meals on time.

Table 8:Frequency of delay in meal timings made by control and intervention group during the last 7 days

Baseline		Frequency	Percent
control group	at least three occasions when meals are not on time, but less than five occasions	5	25.0
	at least five to seven occasions when are not taken on time	4	20.0
	more than seven occasions when a meal is delayed	11	55.0
	Total	20	100.0
intervention group	all meals on time or not more than three meals delayed	1	5.0
	at least three occasions when meals are not on time, but less than five occasions	1	5.0
	more than seven occasions when a meal is delayed	18	90.0
	Total	20	100.0
Follow up			
control group	all meals on time or not more than three meals delayed	9	45.0
	at least three occasions when meals are not on time, but less than five occasions	10	50.0
	at least five to seven occasions when are not taken on time	1	5.0
	Total	20	100.0
intervention group	all meals on time or not more than three meals delayed	20	100.0

Lapse in diet in table 9 below shows that; at baseline 14 (70%) participants in the control group indicated that they had lapse in diet for more than five times while 18 (90%) participants in the intervention group indicated that they had also more than five times lapses in diet. At follow up time 11 (55%) participants in the control group indicated that they had no lapse on diet while 20 (100%) participants in the intervention group indicated that they also had no lapse in diet. These results suggest that adolescents in the intervention group at follow up experienced no lapse in diet. These adolescents might have appreciated the importance of taking the correct food prescribed by the doctors. Therefore the intervention group at follow up highly complied to their prescriptions. Hence they had no laps in diet.

Table 9:Frequency of lapse in diet made by control and intervention group during the last 7 days

Baseline		Frequency	Percent
control group	at least three occasions when a lapse had occurred	3	15.0
	at least three to five times when a lapse has occurred	3	15.0
	more than five times when a lapse had occurred	14	70.0
	Total	20	100.0
intervention group	at least three to five times when a lapse has occurred	2	10.0
	more than five times when a lapse had occurred	18	90.0
	Total	20	100.0
Follow up			
control group	no lapse in diet	11	55.0
	at least three occasions when a lapse had occurred	7	35.0
	at least three to five times when a lapse has occurred	2	10.0
	Total	20	100.0
intervention group	no lapse in diet	20	100.0

Physical exercises in table 10 below shows that; at baseline 7(35%) participants in the control group indicated that they had not exercised at all for over a week while 17 (85%) participants in the intervention group indicated that they had not exercise for over a week as well. At follow up time 3 (15%) participants in the control group indicated that they had exercised at least five times in a week while 20 (100%) participants in the intervention group indicated that they had also exercised at least five times in a week. These results suggest that all the adolescents in the intervention at follow up appreciated exercises as part of their treatment. Adolescents exercised at least five times in a week to strengthen their bodies. Therefore, compliance to exercises was high in the intervention group at follow up.

Table 10: Frequency of any physical exercise done by the control and intervention group during the last 7 days

Baseline		Frequency	Percent
control group	have exercised at least five times a week	4	20.0
	have exercised for three to five times a week	3	15.0
	have exercised less than three times a week	6	30.0
	have not exercised at all for over week	7	35.0
	Total	20	100.0
intervention group	have exercised for three to five times a week	1	5.0
	have exercised less than three times a week	2	10.0
	have not exercised at all for over a week	17	85.0
	Total	20	100.0
Follow up			
control group	have exercised at least five times a week	3	15.0
	have exercised for three to five times a week	9	45.0
	have exercised less than three times a week	4	20.0
	have not exercised at all for over a week	4	20.0
	Total	20	100.0
intervention group	have exercised at least five times a week	20	100.0

Hypoglycemic episodes in table 11 below shows that; at baseline 7 (35%) participants in the control group indicated that they had at least two to three hypoglycemic episodes while 16 (80%) participants in the intervention group indicated that they had more than five episodes. At follow up time 10 (50%) participants in the control group indicated that they had no hypoglycemic episodes while 20 (100%) participants in the intervention group indicated that they also had no frequency of hypoglycemic episodes. These results suggest that the intervention group at follow up experiences no frequency of hypoglycemic episodes. These adolescents might have been compliant to the treatment prescriptions given to them by the doctors. Therefore there was high compliance were all the adolescents in the intervention group at follow up had no frequency of hypoglycemic episodes.

Table 11: Frequency of any hypoglycemic episodes experienced by the control

and intervention group during the last 7 days

Baseline		Frequency	Percent
control group	at least two to three hypoglycemic episodes	7	35.0
	three to five hypoglycemic episodes reported	6	30.0
	more than five episodes	7	35.0
	Total	20	100.0
intervention group	no hypoglycemic episodes reported	2	10.0
	at least two to three hypoglycemic episodes	1	5.0
	three to five hypoglycemic episodes reported	1	5.0
	more than five episodes	16	80.0
	Total	20	100.0
Follow up			
control group	no hypoglycemic episodes reported	10	50.0
	at least two to three hypoglycemic episodes	8	40.0
	more than five episodes	2	10.0
	Total	20	100.0
intervention group	no hypoglycemic episodes reported	20	100.0

Participants' compliance levels were assessed with regard to times at which insulin was taken, units of insulin change, delay in meal timing, lapses in diet, any physical exercises, and hypoglycemic episodes. The total score for compliance was calculated for the two groups based on the responses on the scale. A Mann Whitney U test was conducted to establish whether there was a difference between the control group and the intervention group at baseline and follow up on compliance to treatment.

Table 12 below shows the results for compliance to treatment. The mean for the control group at baseline was 14.60 while that for the intervention group was 26.40 with a Z value of -3.416 ($p = .001$). This indicates that at baseline, there was a significant difference between the control and intervention group.

At follow up, the mean score for the control group was 30.00 and that for the intervention group was 11.00 with a Z value of -5.570 ($p = .000$). Therefore there was a

significant difference between the two groups at the follow up time. Lower score indicates more compliance to treatment. The compliance in the intervention group seems to have improved at follow up than baseline.

Table 12: Compliance to treatment

	Time	Control group mean (n=20)	Intervention group mean (n=20)	Z	P value
Compliance to treatment	Baseline	14.60	26.40	-3.416	.001
	Follow up	30.00	11.00	-5.570	.000

4.5.1 Impact of diabetes

The impact of diabetes on adolescents with diabetes mellitus type 1 was assessed. A Mann Whitney U test was conducted to establish whether there was a difference between the control group and the intervention group at baseline and follow up.

Table 13 below shows the results on impact on diabetes. The mean score for impact on diabetes in the control group at baseline was 17.8 while that for the intervention group was 23 .2 with a Z value of -1.47(p= 0.14). This indicates that at baseline, there was no significant difference between the control and intervention group.

At follow up, the mean score for impact on diabetes for the control group was 24.2 and that for the intervention group was 16.8 with a Z Value of -2.00 (p= 0.045). Therefore there was a significant difference between the two groups at the follow up time. Lower score indicates lower impact of diabetes. Therefore the intervention group seems to have less impact of diabetes compared to the control group on the follow up time.

Table 13: Impact of diabetes

Impact of diabetes	Time	Control group mean (n=20)	Intervention group mean (n=20)	Z	P value
	Baseline	17.8	23.2	-1.47	0.14
	Follow up	24.2	16.8	-2.00	0.045

4.6.1 Worries about diabetes

The adolescents' level of worries about diabetes was also assessed. A Mann Whitney U test was conducted to establish whether there was a difference between the control group and the intervention group at baseline and follow up. The table 14 below shows the results on worries about diabetes. The mean score for the worries about diabetes in the control group at baseline was 22.35 while that for the intervention group was 18.65 with a Z value of -1.018 7(p= .309). This indicates that at baseline, there was no significant difference between the control and intervention group.

At follow up, the mean score for worries about diabetes for the control group was 26.68 and that for the intervention group was 14.32 with a Z value of -3.353 (p= 0.01). Therefore there was a significant difference between the two groups at the follow up time. Lower score indicates fewer worries about diabetes. Therefore the intervention group seems to experience fewer worries about diabetes compared to the control group at the follow up time.

Table 14: Worries about diabetes

Worries about diabetes	Time	Control group mean (n=20)	Intervention group mean (n=20)	Z	P value
	Baseline	22.35	18.65	-1.018	.309
	Follow up	26.68	14.32	-3.353	.001

4.7.1 Satisfaction with life

Satisfaction with life was assessed. A Mann Whitney U test was conducted to establish whether there was a difference between the control group and the intervention group at baseline and follow up.

The table 15 below shows the results on satisfaction with life. The mean score for satisfaction with life for the control group at baseline was 22.42 while that for the intervention group was 18.58 with a Z value of -1.057($p = .290$). This indicates that at baseline, there was no significant difference between the control and intervention group.

At follow up, the mean score for satisfaction with life for the control group was 12.50 and that for the intervention group was 28.50 with a Z value of -4.394 ($p = .000$). Therefore there was a significant difference between the two groups at the follow up time. Lower score indicates more satisfaction with life. Therefore the control group seems to experience more satisfaction with life compared to the intervention group at follow-up time.

Table 15: Satisfaction with life

	Time	Control group mean (n=20)	Intervention group mean(n=20)	Z	P value
Satisfaction with life	Baseline	22.42	18.58	-1.057	.290
	Follow up	12.50	28.50	-4.394	.000

A bivariate correlation coefficient test was conducted at follow up to test the hypothesis that there was a positive correlation between compliance and quality of life at a significance level of 0.01. The results were $r = 0.468$; $p = 0.002$. The table 16 below show the results. Since the significance level was less than 0.01 the alternative hypothesis was

accepted. Therefore, this means that when compliance levels are high adolescent experience a better quality of life.

Table 16: Summary statistics results of correlation coefficient test between compliance levels and quality of life

		Total Quality of Life	Total compliance
Total Quality of Life	Pearson Correlation	1	.468
	Sig. (2-tailed)		.002
	N	40	40
Total compliance	Pearson Correlation	.468	1
	Sig. (2-tailed)	.002	
	N	40	40
**. Correlation is significant at the 0.01 level (2-tailed).			

Conclusion

From the summary of responses presented above it is clear to conclude that there was a relationship between compliance and quality of life among adolescents with diabetes mellitus type 1. Compliance levels were high in the intervention group with regard to compliance with treatment, impact of diabetes worries about diabetes at follow-up compared to the control group, However, satisfaction with life showed a significant difference between the control and intervention group at follow up, were the control group showed more satisfaction with life compared to the intervention group at follow up. However, there was a lot of similarities in the sample between the two groups (control and intervention groups) in the demographic since they were all drawn from the same area and they were almost in the same age range

Despite the adolescents' adjustment problems to compliance, the intervention that the adolescents went through in this study seems to have changed their perception about

themselves, diabetes and treatment. This is evident with the results of the study which indicate that in the intervention group compliance levels were high compared with the control group at follow-up. The hypothesis that there was a positive correlation between compliance and quality of life was also accepted when it was tested at a significant level of 0.01 at follow up using bivariate correlation coefficient.

5.0 DISCUSSION

5.1 Introduction

This chapter discusses the findings that have been presented in chapter four based on compliance to treatment, impact of diabetes, worries about diabetes, and satisfaction with life. The discussion shows the current knowledge based on the literature reviewed and the data collected during field research. The study had a goal of getting accurate information on the relationship between compliance and quality of life among adolescents with diabetes mellitus type 1 and the demographic characteristics of the participants. The study explored the impact of an information giving intervention on compliance and quality of life. Therefore find highlighted the practical implications of results regarding the study.

5.2.1. Compliance among adolescents with diabetes mellitus type 1

5.3.1 Compliance to treatment

This section sought to explore the impact of information giving intervention on compliance and quality of life. Participants' compliance levels were assessed. These results suggest that the intervention group showed more compliance to diabetes

treatment compared to the control group at follow up. Meaning that adolescent's compliance levels were higher in the follow-up group compared to the control group. The study has reflected that there was a positive impact of information giving intervention in the follow-up group. The information that the adolescents received during the intervention period seemed to have had impacted positively in the lives of the adolescents and also influenced positive behaviour change to the treatment regimen prescribed to them by the doctors.

Therefore, such intervention programmes should be encouraged in all health facilities so that adolescents with diabetes mellitus type 1 should benefit new information on diabetes from psychologists and also be counselled during the intervention period in case they are experiencing psychological problems that may bring about less compliance. These findings are consistent with literature that indicates that , adolescents often learn to be more compliant in medication usage, diet and exercise programmes and compliance helps the adolescents understand fully the degree to which their non compliance to diet medication and exercise impact their long term health. (Cadena, 2007).

Therefore, compliance is the number one factor that determines a healthy outcome in the diabetic patients and has a main influence on quality of metabolic control of diabetes mellitus type 1 and on prognosis of the illness. This is also in line with the hypothesis that there was a positive correlation between compliance and quality of life which was accepted when bivariate correlation coefficient was done at 0.01 at follow up. On the contrary, previous studies indicate that knowledge on compliance is not sufficient for

adolescents high levels of compliance, there are behavioural factors which have been found to predict lower compliance rates which include high levels of family stress, poor social coping and problem solving, and inappropriate levels of child responsibility in diabetes management (Parton, 2006). This is important to this study because the study involves adolescents who are still under the care of parents or significant caregivers in the families who are involved in the care. These people have to remind and encourage the adolescents to take their medications and control their diet according to medical prescription. Therefore, the parental behaviour towards the adolescents including knowledge on diabetes with regards to peer interaction has an impact on compliance among adolescents. According to literature adolescents have not yet fully developed risk assessment skills, impulse control of organisational abilities.

Adolescence is a time for development of self-concept and identity. “Who am I” is a fundamental question adolescents struggle with, and the development of a medical condition during these formative years can derail this process (Taddeo, 2008). The psychological and behavioural changes that typically accompany adolescence often culminate in a lack of compliance with treatment and a deterioration of blood glucose control that can be frustrating for the adolescent, his or her family and/or the healthcare provider. Feelings of anger, sadness, frustration, and helplessness may further complicate continued compliance and blood glucose control (Cara, 2008).

Adolescents with diabetes contend with a range of issues and feelings that vary with developmental stage. Feeling different from their peers is the most common issue they face. these concerns fall into five categories: recognizing they have a “disease,” the degree of discipline required in management of diabetes, their concept of wanting to be

normal, and degree of support from family and friends, both for daily self-care and for the costs of the disease; such as doctor visits, hospitalizations, and supplies (Dovoid,2009). Further literature postulates that self-perception is a fragile element in all adolescents therefore the presence of a disease like diabetes that demands constant attention creates compromise with treatment compliance (Cox et., al, 2002).

Research further indicates that the adolescent period involves changes in the hormonal and psychological conditions that affect the development of adolescents social environment, adolescent time spent with peers is highly valued, therefore the existence of many peer influences for adolescents' attitudes and behaviour make the compliance to treatment reduced especially on dietary adjustments (Maylani&wahyu, 2012).Research further postulates that the changing demands of the diseases and adjustment problems might affect both psychological wellbeing and the course of the disease by contributing to poor self management and poor metabolic control in adolescents. Regardless of advances in the perceptive of DMT1 and its management, the regimen remains multifaceted and time consuming which reduce compliance to treatment in adolescents (Baren et.,al 2005).Further research indicate that differential effects with regard to sex, age and duration of illness have been found as main reasons for non-compliance including social circumstances, states of emotion, overcharge and lack of information have been identified (Deak&Baumann,2000). Despite the proven efficacy of intensive treatment, questions about the barriers faced for its application have been reported in research and clinical practice. New habits and behaviors, needed to put intensive treatment in practice, are not always easily incorporated, especially during adolescence (Novato and Gross,2009).

However, previous studies suggests that compliance to diabetes self care regimes during adolescence is particularly poor. The pressures and changes of normal adolescent development can conflict with the self- awareness; restraint and orderliness needed to manage living with a chronic disease, and these tensions create a platform for significant personal and family stress and even mental illness. literature further indicates that an emotionally supportive and accepting parenting style (parental responsiveness) is well-documented as having enduring implications in improved quality of life for children and adolescents with DMT1 (Moore et., al 2013).

The factors to compliance that included; times at which insulin was taken, units of insulin change, delay in meal timings, lapses in diet, physical exercises, and hypolyceamic episodes were also explored. The intervention group was able to comply in line with the above factors to compliance compared to the control group. Knowledge on compliance helps reduce the higher levels of maladaptive coping associated with compliance problems such as anxiety, depression and eating disorders that bring about worse diabetic management in adolescents (Delamater, 2006).

Literature further postulates that, dietary control is one of the important measures to success in management of diabetes mellitus type 1 (Obasi, 2006).Some of the goals in the nutritional management of diabetes include, Exercise which plays an important role in the treatment of diabetes mellitus and it helps to promote metabolism and utilization of carbohydrates, therefore reducing the amount of insulin requirement in the body. Reasonable uniformity in the amount of exercise done from day to day should be

emphasised. Hypoglycaemic control that involves insulin administration is important in order to avoid diabetic complications (Battista et., al 2008).

Furthermore, literature indicates that compliance also help patients to take control of their situations with focus on maintaining emotional and physical health. Noncompliance with diabetes treatment regime can lead to life threatening complications (Novato and Gross, 2009). In this study high compliance level was explained on good motivation, a strong sense of normality, energy and will power, support from parents , physicians and nurses, a positive attitude towards the disease and its treatment with no threat to one's social wellbeing and fears of complications (Kyangas, 2000).

5.4.1 Quality of life among adolescents with diabetes mellitus type 1

5.5.1 Impact of diabetes

To explore the effect of compliance on the quality of life, participant's quality of life was assessed with impact of diabetes, worries about diabetes and satisfaction with life.

The results for impact of diabetes indicated that. The intervention group at follow up had less impact of diabetes compared to the control group at baseline. These results suggest that the adolescents in the intervention group experienced less impact of diabetes at follow up compared to the control group at baseline. The results also indicate that despite adolescents having diabetes they seem to be able to adjust and live positively with the illness. This indicates a positive effect of compliance on the quality of life of adolescents

However, literature according to Cameron et., al (2007) indicate that the adolescents stigma of feeling 'different,' embarrassment about telling friends, coping with the emotional reaction of family members, coping with constant parental questions about their diet, how they are feeling and whether or not they have taken their insulin may make adolescents feel uncomfortable with the illness and react negatively towards people around them. However, despite the above literature the adolescents in the intervention group were able to experience a lower impact of diabetes meaning that they were able to cope with diabetes. This could be because adolescents appreciated the information giving intervention. This made the adolescents develop a positive mind about diabetes. Studies further indicate that knowledge on improving compliance enhances lower impact of diabetes, help improve compliance to treatment and acceptance as adolescents with diabetes mellitus type 1 continue living (Dlamater, 2006). Therefore the knowledge adolescents received during intervention period was able to change their negative perception and feelings about diabetes hence positive impact of information giving intervention.

On the contrally, the multiple physiological and psychosocial modifications occurring during adolescence compromise diabetes treatments during this developmental period and often, the adolescent show serious difficulties in compliance to self-care management of diabetes and the prevention of its complications. The conflicts arising from the demands and complexities involved in the self-management of diabetes, and the adolescent's expectations regarding their own experiences, in this developmental phase, may account for this scenario (Almeldaet., al 2013).

Baumann and Deak,(2000) further postulates that compliance has the main influence on quality of metabolic control of diabetes mellitus type 1 and prognosis in the course of illness. Studies further show that lack of information has been identified as the main reason for non compliance. Therefore knowledge on compliance will enhance higher quality of life and will help reduce the higher levels of stress and maladaptive coping associated with compliance problems such as anxiety, depression and eating disorders that bring about worse diabetic management in adolescents (Delamater, 2006).

Therefore, the information giving intervention programmes should be scaled up in all the health centers so that the adolescents benefit psychological treatment during interaction with the psychologist. This would help the adolescents improve their compliance levels reduce the level of diabetes impact in their lives and improve their quality of life.

5.6.1 Worries about diabetes

The effect of compliance on quality of life was further explored with Worries about diabetes. The Results indicated thatthe intervention group at follow up showed less worries about diabetes compared to the control group at baseline. This means that adolescents in the intervention group at follow up experienced less worries about diabetes compared to the adolescents in the control group at baseline. Therefore there wasa positive impact of information given to the adolescents during intervention at follow up. This means that adolescents' negative perceptions about diabetes might have been changed at follow upand the information which adolescents receivedmight have reassured them that diabetes is one of the illnesses that one has to live with this might have made them accept the illness thereby reducing their worries about diabetes. Furthermore,theadolescents in the intervention group experienced less worries

because they were able to interact with each other during the intervention period. They also seemed to have shared their experiences on how to cope with diabetes, social interaction with the parents and family and the positive perception about diabetes. They also seemed to support each other in times of need since they become close to each other.

Although contrarily to the findings literature indicate that adolescents may struggle to incorporate a medical condition into their evolving sense of self associated with psychological consequences such as worries about the illness, depression, stress and eating disorders (Frank, 2007). This may appear to psychologists as denial of the illness and failure to recognize the seriousness of the illness. This may lead to low compliance with diabetic treatment recommendations that include diet, exercise, insulin administration and Hypoglycaemic control (Taddeo, 2008). Therefore, less psychological consequences such as worries would help adolescents with diabetes mellitus type 1 manage their diabetes and reduce negative consequences. Although adolescents experienced less worries in the follow up group in this study, research postulates that living with and managing diabetes every day can be a struggle (Cameron et.,al 2007). Children are commonly worried about: feeling like they are a burden on the family being treated differently or delicately, as if they are 'sick,' coping with constant parental questions about their diet, how they are feeling and whether or not they have taken their insulin further more because of the complex treatment regimen that include injecting oneself every day diabetes in adolescents poses serious physical, mental and emotional challenges that include worries about diabetes this may interfere with

treatment hence lead to adolescents experiencing worries about diabetes thereby reducing quality of life (Frank,2005).

Previous studies further postulates that, psychological, emotional, and social factors not only impact quality of life but also often play a role in chronic illness outcomes. Diabetes care, in particular, is greatly influenced by psychosocial factors which hinder a person's ability to self-manage the disease and achieve metabolic control. Moreover, the various challenges related to diabetes add to the burden of illness and can cause even more psychological distress (Kent et al., 2010).

Recognizing that people with diabetes fare better when they adequately deal with the psychosocial issues in their lives, the American Association of Diabetes Educators (AADE) has identified healthy coping as one of the self-care behaviours essential for effective diabetes self-management. This includes healthy eating, being active, monitoring, taking medication, problem solving, and reducing risks. (Kent et al., 2010).

Diabetes can affect an adolescent's emotions both directly and indirectly. Poorly controlled blood sugar can directly affect the emotions by causing behaviour changes, such as bad temper. Adolescents with diabetes have an increased risk of depression and worries. To reduce these psychological effects diabetes specialists should be included such as a social worker or psychologist as part of a diabetes care team. The intervention period had a positive impact on the adolescents in the intervention group because it helped reduce their worries about diabetes thereby improving their quality of life. Furthermore, such interventions must be considered very important in other health centers in Zambia.

5.7.1 Satisfaction with life

Furthermore, satisfaction with life was explored. The Results showed that; the intervention group showed less satisfaction with life compared to the control group at follow up. Such outcome of results could have been due to the behavioural factors which have been found to predict less satisfaction with life that include high levels of family stress, poor social coping and inappropriate levels of responsibility in diabetes management (Taddeo, 2008). Adolescents are still under the care of parents or significant caregivers in the families who are involved in the care. These people have to remind and encourage the adolescents to take their medications and control their diet according to medical prescriptions. Therefore, negative parental behaviour towards the adolescents may lead to less satisfaction with life among adolescents. Parents and care givers may sometimes push adolescents too hard to autonomy that may increase the risk of problems with treatment compliance and poor metabolic control leading to less satisfaction with life. The services offered to the adolescents may be taking too long for them to cope with and the reception by health workers might be unfriendly to them. This might have caused some fear in them leading to less satisfaction with the treatment.

However, previous research postulates that positive parental behavior and care giver support of adolescents and positive effect of peer support reduce feelings of isolation and loneliness in adolescents. This contributes to more compliance which leads to more satisfaction with life. The time spent with the family and peers can influence positive attitudes and behaviour that would influence positive effects on adolescents self management that would promote more satisfaction with life (Grayson, 2002).

Literature further indicates that adolescents may find diabetes to be stressful. An adolescent who is newly diagnosed may have a range of reactions and emotions that may include shock denial, anger sadness fear and guilt (Gavin & Wysocki, cited in Butner, 2009).

Further literature postulates that moving toward independence from their parents, adolescents typically want to make their own choices and have a sense of control over their lives. Having a disease may make them feel powerless and they try to gain control by not taking medications, missing appointments or not following dietary restrictions (Health information, 2012). Sometimes, the parents may have developed an overprotective parenting style, which can delay the teen's ability to take responsibility for his or her treatment or cause frustration for the adolescent (Taddeo, 2008). Adolescents in particular, may have a particularly hard time dealing with diabetes. A child who has been very good about sticking to his or her diabetes regime may rebel in the teen years by ignoring his or her diabetes care plan. Adolescents may also have a harder time telling friends or boyfriends or girlfriends that they have diabetes because they want to fit in. This may lead to poor compliance that may lead to less satisfaction with treatment (Kent et al, 2010). Other studies also indicate that satisfaction with life is also interfered by stigma associated with the treatment this is because the treatment regimen required to manage diabetes include actions that are noticeable by others for example administering insulin, eating at specified times in addition to symptoms of hypoglycemia this interferes with compliance to treatment hence less satisfaction with life (Maylani & Wahyu 2012).

Adolescents with diabetes tend to ignore their vulnerability to potential consequences of their disease in their age appropriate preoccupation with the present (Guthrie, 2003). Such care programmes should be continued in the health centers with the help of qualified psychologists who would help adolescents through counselling that will enhance them appreciate their lives while living with the diabetes condition. This will help adolescents lead a positive life that would promote satisfaction with life leading to better quality of life.

Research indicates that health status and quality of life are affected by psychological and social factors. Psychological distress directly affects health and indirectly influences a person's motivation to keep their diabetes in control. When motivation is dampened, the commitments required for effective self-care are difficult to maintain. When barriers seem insurmountable, good intentions alone cannot sustain the behaviour. Coping becomes difficult and a person's ability to self-manage their diabetes deteriorates (Kent et., al 2010).

CHAPTER SIX

6.0 Conclusion

According to findings the researcher found that the demographic results indicate a lot of similarities in the sample between the two age groups (control and intervention groups). Therefore the two groups were comparable.

The adolescents compliance to treatment, impact about diabetes and worries about diabetes were highly significant at follow up compared to the control group and that the information that the adolescents received during the intervention period seemed to have had impacted positively in the lives of the adolescents and also influenced positive behaviour change to the treatment regime prescribed to them by the doctors. The hypothesis that there was a positive correlation between compliance and quality of life was accepted when the bivariate correlation coefficient test was done at a significant level of 0.01. This is in line with literature that indicates that, adolescents often learn to be more compliant in medication usage, diet and exercise programmes and compliance helps the diabetes patients understand fully the degree to which their non compliance to diet medication and exercise impact their long term health (Cadena, 2007). Therefore, compliance is the number one factor that determines a healthy outcome in the diabetic patient. Compliance also helps patients to take control of their situations with focus on

maintaining emotional and physical health. Noncompliance with diabetes treatment regime can lead to life threatening complications (Novato and Gross, 2009).

However, satisfaction with life had a different picture because the intervention group had less satisfaction with life compared to the control group at follow up. This could have been because of poor parental or care giver responsibility and adolescents in ability to accept the condition leading to less satisfaction with life. The adolescents might have had experienced poor reception services from the health workers leading to less satisfaction with the process of acquiring treatment during their visit to the hospital.

Previous studies further indicate that adolescents with type 1 diabetes are faced with complex developmental changes as well as changing demands of the disease that lead to poor metabolic control less satisfaction with life and lower degree diabetes- related quality of life (Graue et al., 2004).

6.1 Implications of the study

The results in this study have generally created knowledge that is valuable in the health care system. It has an important aim of promoting compliance in adolescents with DMT1. Insights into patient compliance and care has provided important background knowledge for the development of therapeutic information giving intervention programmes in other health facilities aimed at improving compliance and health related quality of life among adolescents with DMT1.

Adolescents are able to follow the prescribed treatment regimen when given correct information on the importance of compliance, this is evident in this study were adolescents indicated high compliance with treatment according to the doctor's

prescription that included meals insulin exercises and hypoglycemic control in the intervention group at follow up than in the control group at baseline.

6.2 Limitations of the study

These findings cannot be generalized because the sample size is small, too homogeneous to be generalized to other settings. Furthermore findings from this sample do not represent other adolescents with diabetes mellitus type 1 in other areas of Zambia. Additionally data was derived exclusively from self-reports which can contribute bias related to defensiveness of participants. Since data was gathered at one point it is impossible to determine whether psychological distress developed during intervention or after. The study characterizes a group of people who are more at risk of poor compliance hence factors such as parental neglect might interfere with their treatment regime though compliance levels improved after intervention in the follow up.

6.3 Recommendations

Compliance to treatment

The researcher recommends that information giving interventions should be incorporated in the mainstream adolescent treatment programmes in all health facilities in Zambia in order to encourage access to new information, allow adolescent interaction with the health care providers and promote compliance. These programmes should include psychologists in order that expert intervention is accessed by adolescents with diabetes mellitus type 1 hence help them live a positive life leading to better compliance to treatment.

Impact of diabetes

The researcher also recommends that similar research should be done in other towns in

Zambia using the same population in order to establish adolescents' quality of life in relationship to compliance. Literature according to Cameron et al. 2007 indicate that the adolescents stigma of feeling 'different,' embarrassment about telling friends, coping with the emotional reaction of family members, coping with constant parental questions about their diet, how they are feeling and whether or not they have taken their insulin may make adolescents feel uncomfortable with the illness and react negatively towards diabetes and people around them. Therefore information would be very useful in encouraging adolescents react positively about diabetes mellitus.

Worries about diabetes

The effect of worries about diabetes suggests incorporating the home environmental factors which may be possible variances facilitating the worries about diabetes. Therefore the researcher recommends that future investigations about compliance should include caregiver behaviors and cognitions as well as adolescents environmental variables which may be possible contributors to compliance and quality of life.

These findings also suggest introduction of eclectic versions of psychosocial counseling programmes in order to help adolescents' compliance and worries. For example cognitive behavioral therapy is a directive skill based treatment that focuses on strategies that are designed to directly improve the symptoms of worries as such future studies should assess worries about diabetes in adolescents and the consequences that it may have on quality of life of adolescents.

Satisfaction with life

The researcher further recommends that a policy should be put in place that would help the adolescents' access treatment that includes scaling up counseling for diabetes in all

health facilities. This will help adolescents develop a positive mind and promote satisfaction with life despite having diabetes mellitus. Different groups should also be exposed to the similar study at different times in order to enhance adolescents appreciate compliance. This will encourage adolescents to develop mental models of representation on time and routine of taking their medication hence promote satisfaction with life.

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Appendix 1 Consent form

UNZAREC FORM 1b

**THE UNIVERSITY OF ZAMBIA
DIRECTORATE OF RESEARCH AND GRADUATE STUDIES**

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Fax: +260-1-290258/253937
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P. O.
Lusaka,

HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

CONSENT FORM

TITLE OF RESEARCH: The relationship between compliance and quality of life
among adolescents with diabetes mellitus type 1

REFERENCE TO PARTICIPANT INFORMATION SHEET:

This research is being carried out by researcher in the Department of Psychology at the
University of Zambia. .

Why have you been chosen?

Adolescents who are aged between 16 and 19 years enrolled at Diabetic Association of Zambia (DAZ) in Lusaka will be asked to take part in this study.

What will happen if I take part?

You will be asked to fill in a questionnaire about your behaviour, your relationships with your friends and your feelings. You will not put your name on the questionnaire but we will ask for some information about your family such as how many brothers and sisters you have. . You will be asked to come to DAZ once a week (1 hour each) for 8 weeks and take part in group activities. You will be given transport allowance and also provided with refreshments.

Do you have to take part?

It is up to you whether you take part. If you do not take part it will not affect the medical care or any other benefit. If you do take part you can withdraw from the study at any time, again with no penalty and without having to give a reason

What will happen to the information I give?

The information is confidential. The research will not identify you individually and no one other than the researcher will know what you have said. The questionnaires will only numbers not names. We will also remove any information that you give that can identify you personally. We hope the results from the study will help us to develop a programme of support for young people diabetes mellitus type 1.

Who can I ask if I have any questions?

If you would like to ask any questions about the research then you can ring Mary Ngandu Malipa 0977-828767. You can also contact the Research Ethics Office, University of Zambia, tel: 250753, UNZA Lusaka.

Thank you for reading this document.

CONSENT (PARTICIPANT)

The participant should complete the whole of this sheet himself/herself

Cross out as necessary

- Have you read & understood the information sheet? YES/NO
- Have you had opportunity to ask questions & discuss the study? YES/NO
- Have all the questions been answered satisfactorily? YES/NO
- Have you received enough information about the study? YES/NO
- Who have you spoken to Dr/Mrs/Ms
- Do you understand that you are free to withdraw from the study
- at any time YES/NO
- without having to give a reason YES/NO
- without affecting your future medical care YES/NO
- Do you agree to take part in the study? YES/NO

If you agree to take part in the study, please sign below:

Signature
(participant)

Date

I have explained the study to the above participant and he/she has indicated his/her willingness to participate.

Signature
(Researcher/research assistant)

Name (In block capitals)

Date

Appendix 2 Study time-line

Date (2012-2013)

No	Activity	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
1.	Submission of proposal and approval from the ethics board	X										
2.	Feedback/Sampling/recruitment for baseline phase		X	X								
3.	Intervention phase study			X	X							
4.	Conducting follow up				X							
5.	Data analysis					X	X	X				
6.	Thesis writing and submission							X	X	X	X	X
	* The study will be done in three levels at DAZ center. (UTH). That is pre-assessment in the first week, intervention in the next 8 weeks once a week and post assessment in the 10 th week. The Diabetes quality of life modified for youths and diabetes compliance questionnaires will be used both at baseline intervention and follow up in order to assess the effects of compliance on quality of life among adolescents.											

Appendix 3 Budget

Items	Quantity	Amount/unit (k)	Total
Transport to sites	10 x 10 x 1	100,000	100,000
Transport for	10 x 40	40,000	400,000

participants			
Refreshments for participants	80 x 10	800	800,000
Reams of paper	10 x 30	300,000	300,000
Communication (includes internet and telephone)		500,000	500,000
Miscellaneous		300,000	300,000
		Grand Total	2,300,000

Appendix4 Demographic Questionnaire

BACKGROUND

This is a questionnaire reviewed by the researcher for completeness. The researcher will clarify any questions the participant may have regarding completion of this questionnaire. It may be helpful for the participant to answer all the questions on the questionnaire for increased accuracy.

INSTRUCTIONS

1. The participant to indicate the appropriate response after reading the question.
2. The participant to pay close attention to word following the questions.
3. The researcher to review for completeness and accuracy.

NOTE

1. Do not put your name on the questionnaire
2. Answer all the questions in this questionnaire, tick were appropriate.

1. Tick one

Age 16-17: ☐ ☐

18-19 ☐ ☐

2. Tick one

Sex: F: ☐

M: ☐

3. Educational level.....

Grade 0 to 7 ☐

8 to 10 ☐

10 to 12 ☐

College ☐

University ☐

4. Marital status.....

5. Occupation.....

6. Number of children ☐

7. Who do you live with?

My mother ☐

My father ☐

Both my mother and my father ☐

Neither my mother nor my father ☐

8. How common is diabetes in your family?

Not common at all ☐

Not very common ☐

Average ☐

Fairly common ☐

Very common ☐

9. How many adults live in your house hold?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

10. How many children live in your house hold?

0

Appendix 5 Rating Scale for Compliance questionnaire

Insulin:

1. Time at which insulin is taken.
 - 0: Taken on time on all days
 - 1: Not take on time on at least two occasions
 - 2: At least three occasions on which insulin is not taken on time
 - 3: More than three occasions when insulin is not taken on time
2. Units of insulin (more than three prescribed amount of change).
 - 0: No change made by the patient (other than allowed dosage variation)
 - 1: Once but more than the prescribed dosage.
 - 2: Two-three times a change is made.
 - 3: More than three times that a change is made in the prescribed dosage.

Diet in the last one-week:

1. Delay in meal timings
 - 0: All meal on time or not more than three meals delayed.
 - 1: At least three occasions when meals are not on time, but less than five occasions
 - 2: At least five to seven occasions when are not taken on time
 - 3: More than seven occasions when a meal is delayed
2. Lapse in diet, described as consumption of foods to be avoided, e.g. aerated drinks, sweet, and certain varieties of fruits.
 - 0: No lapse in diet.
 - 1: At least three occasions when a lapse has occurred.

- 2: At least three to five to five times when a lapse has occurred.
- 3: More than five occasions when a lapse has occurred.

Exercise:

This includes any form of physical exertion, such as walking skipping or playing of any sport.

- 0: Have exercised at least five times a week.
- 1: Have exercised for three to five times a week.
- 2: Have exercised less than three times a week.
- 3: Have not exercised at all for over a week.

Hypoglycaemic Episodes

The frequency of hypoglycaemic episodes was recorded.

- 0: No hypoglycaemic episodes reported.
- 1: At least two to three hypoglycaemic episodes.
- 2: Three to five hypoglycaemic episodes reported.
- 3: More than five episodes.

Appendix 6 Diabetes Quality of life scale- for youths

Scale: 1= Never; 2= very seldom; 3= sometimes; 4= often; 5= all the time.

Impact of diabetes

1. How often do you feel pain associated with the treatment 1 2 3 4 5 for your diabetes?
2. How often are u embarrassed by having to deal with 1 2 3 4 5 your diabetes in public?

3. How often do you physically feel ill? 1 2 3 4 5
4. How often does diabetes interfere with your family life? 1 2 3 4 5
5. How often do you have a bad night's sleep? 1 2 3 4 5
6. How often do you find diabetes limiting your social relationships
and friendships? 1 2 3 4 5
7. How often do you feel good about yourself? 1 2 3 4 5
8. How often does your diabetes interfere with your exercise? 1 2 3 4 5
9. How often do you feel restricted by your diet? 1 2 3 4 5
10. How often does your diabetes keep you from playing or doing
Your homework? 1 2 3 4 5
11. How often do you miss work, school or household duties
Because of your diabetes? 1 2 3 4 5
12. How often do you find yourself explaining what it means to
Have diabetes? 1 2 3 4 5
13. How often do you find that your diabetes interrupts your
Leisure activities 1 2 3 4 5

Scale -1= Never; 2= Very seldom; 3= sometimes; 4= often; 5= all the time.

14. How often do you find that your diabetes prevents you from
Going to eat with your friends? 1 2 3 4 5
15. How often are you teased that you have diabetes? 1 2 3 4 5
16. How often do you feel that because of your diabetes you go to
the bathroom more than others? 1 2 3 4 5
17. How often do you find yourself eat something you shouldn't
rather than tell someone that you have diabetes? 1 2 3 4 5
18. How often do you find that your diabetes prevents you from
Participating in school activities
(for example, being active in a school) 1 2 3 4 5
Play, being in a sport team, being in a school band etc)? 1 2 3 4 5

19. How often do you find that your diabetes will limit what job you 1 2 3 4 5
in the future?
20. How often do you think that your parents/guardians are over 1 2 3 4 5
protecting you?
21. How often do you find your parents/guardians worry too much 1 2 3 4 5 about
your diabetes?
22. How often do you find your parents/guardians act like the diabetes 1 2 3 4 5
is theirs rather than yours?

Worries about diabetes

1. How often do you worry whether you will get married? 1 2 3 4 5
2. How often do you worry about whether you will have children? 1 2 3 4 5
3. How often do you worry about whether you will get a job? 1 2 3 4 5
4. How often do you worry about whether you will collapse or faint? 1 2 3 4 5
5. How often do you worry about whether you will be able to
Complete your education? 1 2 3 4 5
6. How often do you worry that your body looks different because
You have diabetes? 1 2 3 4 5

- Scale

- 1=Never; 2=Very seldom; 3= Sometimes; 4=Often; 5=All the time.

7. How often do you worry whether someone will not go out with you
Because you have diabetes? 1 2 3 4 5
8. How often do you worry that your teachers treat you differently
Because you have diabetes? 1 2 3 4 5
9. How often do you worry because you have diabetes? 1 2 3 4 5

Satisfaction with life

1. How satisfied are you with the amount of time it takes to deal with

Your diabetes every day? 1 2 3 4 5

2. How satisfied are you with the amount of time you spend getting

Check-ups? 1 2 3 4 5

3. How satisfied are you with your current treatment?

1 2 3 4 5

How satisfied are you with the flexibility you have in your diet?

1 2 3 4 5

4. How satisfied are you with the burden your diabetes is placing

On your family? 1 2 3 4 5

5. How satisfied are you with your knowledge about your diabetes? 1 2 3 4 5

7. How satisfied are you with your life in general? 1 2 3 4 5

8. Compared with others of your age would you say that your health is

a) Excellent

b) Good

c) Fair

d) Poor

Appendix 7: Information Booklet for Teachers

TITLE: YOU AND ME AND DIABETES

EDITION KIDS AND CARE SOUTH AFRICA

TITLES IN THE BOOK

1. Diabetes mellitus

2. What is diabetes?

3. Treatment

4. Measuring blood glucose levels

5. Hypo and hyper

6. Nutrition and diet

7. Stress

8. Sport and exercise

9. Environment

10. Personal pages

11. Teaching programme

12. Summary