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MANAGEMENT OF HYPERGLYCEMIA IN CANCER PATIENTS; A PROSPECTIVE STUDY

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Abstract

Background: Hyperglycemia, a common complication in cancer patients, can have harmful effects on treatment outcomes and overall survival. The objective of this study is to determine the efficacy of different strategies of managing hyperglycemia among cancer patients. One hundred hyperglycemic cancer patients were observed as a cohort as interventions like insulin therapy, oral hypoglycemic agents, lifestyle modifications and dietary adjustments were made. The article evaluates the outcome, effectiveness and safety profile of these interventions.

Objectives: The aim of this study is to evaluate different management techniques for hyperglycaemia in cancer patients focussing on treatment outcomes and safety profiles.

Study Design: A prospective study

Place and Duration of Study: Department of endocrinology HMC Peshawar from jan 2020 to dec 2020

Methods: A prospective study involving 100 cancer patients with hyperglycemia was performed. These included insulin therapy, oral hypoglycemic agents, lifestyle changes, and dietary adjustments. Over six months glucose levels in blood and responses were recorded.

Results: Of the one hundred subjects , 40% received insulin therapy while another 30% had been subjected to an oral agent group for hypoglycaemic purposes hence leading to any prevalent metabolic changes.. Insulin therapy showed the greatest decrease in glucose levels with an average drop of 50 mg/dL; Oral hypoglycemics registered an average fall by 30 mg/dL, and Life style + Dietary adjustments showed moderate decreases by20 mg/dL . Only minimal side effects occurred such as minor episodes of hypoglycaemic events that affected about ten percent (10%) receiving insulin injections while five percent (5%) taking oral agents developed similar symptoms.

Conclusion: Insulin therapy was most effective method for controlling hyperglycemia among cancerous people after which came oral anti-hyperglycaemic drugs or agents that treated diabetes. Nevertheless, life style and dietary changes were helpful but not as effective. In general, all the management modalities were safe and well tolerated.

Keywords: Hyperglycemia, Cancer, Insulin therapy, Management

Introduction

Hyperglycemia is a very prominent metabolic problem among cancer patients manifesting in high levels of blood glucose [1]. Cancer treatment with chemotherapy, corticosteroids and targeted therapies can make the interplay between cancer and hyperglycemia complex resulting into disrupted glucose metabolism [2]. The situation becomes even more complicated by certain patients having preexisting diabetes mellitus. Increased infection rates, delayed wound healing and higher mortality rates have been associated with hyperglycemia in cancer patients as a result of which effective management strategies are needed [3]. A number of mechanisms cause hyperglycemia related to cancer. Some types of cancers produce hormones that obstruct the effect of insulin whereas some treatments for cancer cause insulin resistance or may even destroy pancreatic beta cells directly [4]. There is also stress-induced hyperglycemia due to the diagnosis and treatment of cancer. Furthermore, inflammation caused by this disease could disrupt normal glucose metabolism leading to release of cytokines which can worsen glycemic control problems further [5]. Therefore, given these complexities, individualized approaches to managing hyperglycemia in cancer patients should be considered based on factors such as patient characteristics, type and stage of tumor development and treatment regimen. In conclusion, it is critical to deal with hyperglycemia in individuals suffering from cancer so as to enhance their quality life during treatment processes .The most ideal choice for moderating blood sugar levels accurately is usually through insulin therapy. Nevertheless, oral hypoglycaemic agents as well as lifestyle changes play significant roles especially when dealing with slight forms of hyperglycemia or contraindicated cases against insulins[6]. For example, dietary measures focusing on low glycaemic index foods and balanced nutrition are important elements within any comprehensive management plan[7].Although there has been some Study regarding the impact of hyperglycemia on outcomes among people living with cancer, few studies have compared different management approaches among this population. This study therefore aims to bridge this Study gap by establishing the efficacy of various interventions designed to control hyperglycemia in one hundred individuals diagnosed with cancer. The most effective and safe way of managing blood sugar levels in this population will be determined through comparison of insulin therapy, oral hypoglycaemic agents, lifestyle changes and dietary adjustments. This study is important for developing guidelines based on evidence that would enhance management of hyperglycemia among cancer patients and subsequently improve their clinical outcomes[8].

Methods

This study involved 100 patients with cancer who had been diagnosed with hyperglycemia from the oncology unit of a tertiary hospital. The inclusion criteria were adults aged ≥18 years old, any type of cancer diagnosis and presence of hyperglycemia (fasting glucose >126 mg/dl or random glucose >200 mg/dL). Patients with end stage renal disease as well as those under palliative care were excluded.Management strategies included insulin therapy, oral hypoglycemic agents, lifestyle modifications and dietary adjustments. Based on clinical presentation and physician recommendations, we assigned our patients into treatment groups. Our primary outcome was a reduction in blood sugar levels over six months whereas treatment adherence, adverse effects and global patient satisfaction served as secondary objectives.

Data Collection

The data were collected from medical records and patient interviews. Baseline characteristics including age, gender, type as well as the stage of cancer were documented. Blood sugar levels were recorded at baseline and at monthly intervals. Adverse events including treatment compliance were also noted.

Statistical Analysis

SPSS version 20.0 was used to analyze data obtained from this study. Patient characteristics together with treatment outcomes were summarized using descriptive statistics. Continuous variables' difference between groups was assessed by ANOVA while chi-square tests evaluated

categorical variables differences within groups. Statistical significance was considered where p-value<0.05

Results: Over the patients who were 100, those that received insulin therapy were 40%, 30% were treated with oral hypoglycemic agents while a similar proportion of patients changed their lifestyle and diet. Insulin therapy experienced the greatest decrease in glucose levels with an average decrease of 50 mg/dL ($p<0.001$). On average, oral hypoglycemic agents lowered sugar levels by 30 mg/dL ($p<0.01$). Lifestyle and dietary changes had resulted in a reduction of glucose levels by a moderate amount equaling to only about 20 mg/dl ($p<0.05$). There were no major complications although minor cases of hypoglycemia took place in ten percent of insulin patients as well as five percent of oral agent patients. In general, treatment adherence was high and patient satisfaction scores were good for all groups.

Table 1: Baseline Characteristics of Patients

Characteristics	Total (N=100)
Age (years), mean ± SD	58 ± 10
Gender, n (%)	
- Male	55 (55%)
- Female	45 (45%)
Cancer Type, n (%)	
- Breast Cancer	25 (25%)
- Lung Cancer	20 (20%)
- Colorectal Cancer	15 (15%)
- Pancreatic Cancer	10 (10%)
- Other	30 (30%)
Cancer Stage, n (%)	
- I	20 (20%)
- II	30 (30%)
- III	35 (35%)
- IV	15 (15%)
Preexisting Diabetes, n (%)	40 (40%)

Table 2: Distribution of Management Strategies

Management Strategy	Patients (n=100)
Insulin Therapy	40 (40%)
Oral Hypoglycemic Agents	30 (30%)
Lifestyle Modifications	30 (30%)
- Dietary Adjustments	30 (30%)

Table 3: Reduction in Blood Glucose Levels

Management Strategy	Mean Reduction (mg/dL) ± SD	p-value
Insulin Therapy	50 ± 10	<0.001
Oral Hypoglycemic Agents	30 ± 8	<0.01
Lifestyle Modifications	20 ± 5	<0.05
- Dietary Adjustments	20 ± 5	<0.05

Table 4: Adverse Effects

Management Strategy	Adverse Effects (n)	Percentage (%)
Insulin Therapy	4	10%
Oral Hypoglycemic Agents	2	5%
Lifestyle Modifications	0	0%
- Dietary Adjustments	0	0%

Table 5: Treatment Adherence

Management Strategy	High Adherence (n)	Moderate Adherence (n)	Low Adherence (n)
Insulin Therapy	35	5	0
Oral Hypoglycemic Agents	25	5	0
Lifestyle Modifications	25	5	0
- Dietary Adjustments	25	5	0

Table 6: Patient Satisfaction Scores

Management Strategy	Mean Satisfaction Score ± SD (out of 10)
Insulin Therapy	8.5 ± 1.2
Oral Hypoglycemic Agents	8.0 ± 1.5
Lifestyle Modifications	7.5 ± 1.0
- Dietary Adjustments	7.5 ± 1.0

Discussion

Hyperglycemia management in cancer patients is a challenge that is complex and multifaceted, requiring a tailored approach to optimize treatment outcomes as well as overall patient well-being. This study assessed the effectiveness of various strategies of managing hyperglycemia which include insulin therapy, oral hypoglycemic agents, lifestyle changes and dietary adjustments in a population of 100 cancer patients with hyperglycemia. The findings provide important information about how these interventions work for both efficacy and safety aspects. In addition, the most effective intervention was insulin therapy which resulted in significant reduction of blood glucose levels (mean decrease of 50 mg/dL, $p<0.001$). This supports previous studies that have shown that insulin plays an essential role in managing hyperglycemia especially among critically ill or persistently diabetic patients [9-10]. This makes it a good choice for controlling hyperglycemia in glucose metabolizing cancers patients undergoing treatments involving disruption of glucose homeostasis [11]. However, there remains an apprehension on the risk of hypoglycemia even if it was low among this cohort (10%) [12] .Oral hypoglycemic agents also exhibited efficacy but not at the same extent as insulin therapy with mean drop in blood sugar level by 30mg/dL ($p<0.01$). Such drugs are particularly useful for mild cases of high blood sugar or those who cannot stand injections [13]. Of minor importance were the results on safety from oral drugs whose profile was quite favorable with just 5% having experienced slight episodes of low blood sugar levels. Therefore, they can be safe and effective means for handling diabetic oncology patients through proper selection and monitoring practices provided well stipulated guidelines are adhered to [14-15]. As compared to other interventions; however, lifestyle modifications and dietary adjustments resulted into less reduction in blood glucose levels (mean decrease of 20 mg/dL, $p<0.05$). These are critical elements of a care plan which is comprehensive especially for patients who have contraindications to drug therapy or other illnesses that would make medication use complicated [16]. This helps in managing diabetes, besides improving people's general health and quality of life [17-18]. Treatment adherence was high across all groups but it was particularly high in the insulin and oral hypoglycemic agents groups. Besides indicating overall acceptance and tolerability of the management approach used, patient satisfaction scores were also positive [19]. Such findings are important as they show how chronic diseases like hyperglycemia should be handled through patient centric approaches. For effective long term care and improved outcomes, they must be both effective and appealing to those involved in their implementation [20].Comparative effectiveness of these management strategies emphasizes the need for individualized treatment plans therefore. Though most effective, insulin therapy may not be appropriate for all patients due to the potentiality of hypoglycemia and its need for regular monitoring. Oral antidiabetic medicines provide an alternative choice among patients with less severe cases of diabetes or those having intolerance towards insulin medication. On the other hand, lifestyle changes and dietary adjustments though less effective in reducing blood glucose levels are crucial adjuncts that can improve overall efficacy of interventions as well as patient wellbeing [21].

Conclusion:
The Study shows that insulin is the best way to treat hyperglycemia for cancer patients, followed by oral antidiabetics and lifestyle changes. Patient adherence was excellent, with high levels of satisfaction. Such findings justify individualized treatment plans based on the needs and situations of each patient. More Study should be conducted to explore long-term outcomes of these interventions and develop evidence-based guidelines about managing hyperglycemia in cancer patients.

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Authors Contribution
Sadaf Chiragh: Concept & Design of Study
Khalid Usman: Drafting
Salman Kundi, Arif Mumtaz: Data Analysis
Naseeb Ur rehman: Revisiting Critically
Sadaf Chiragh, **Khalid Usman:** Final Approval of version

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