EFFECT OF CARBOHYDRATE COUNTING ON GLYCEMIC CONTROL OF PATIENTS WITH TYPE 1 DIABETES: A SYSTEMATIC REVIEW

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Abstract

Objectives -The management of Type 1 diabetes is always challenging, the knowledge of carbohydrate counting is helpful in achieving and maintaining the glycemic control in these patients. The objective of this study was to examine the literature evaluating the effect of education programme regarding carbohydrate counting on glycemic control in patients with type 1 diabetes.

Methods -Medline, Cochrane and pubmed databases were systematically searched to identify studies published from 2009 to 2020.

Result- The literature search yielded 82 articles (Cochrane 48 and Pubmed 34) were reviewed. After removing duplicates and screening the titles and abstracts 17 articles were selected for full text and 7 studies were selected which met the inclusion 7 randomized control studies are included which are done patients with type 1 diabetes.

Conclusion-Carbohydrate counting is an important strategy in management of patients with type 1 diabetes .this study highlights on importance of training to the patients and caregivers regarding carbohydrate counting and its effect on glycemic control which helps in the management of patients with type 1 diabetes.

Keywords –carbohydrate counting, glycemic control, type 1 diabetes.

Introduction

Destruction of beta cells of pancreas is the cause of 5-10% cases of diabetes, which leads to deficiency of insulin. The management of type 1 diabetes is insulin administration, changes in lifestyle which consists of diet, physical activity, self monitoring of blood sugar level and prevention of hypoglycemia which can be achieved by counting carbohydrate consumed in diet and adjusting the dose of insulin accordingly.

To achieve normal glycemic control in patients with type 1 diabetes it is necessary to train them regarding carbohydrate counting and insulin dose calculation through education programme.

Objectives

The aim of this study was to summarize the evidence supporting the training of carbohydrate counting and its effect on glycemic control in managing patients with type 1 diabetes.

Methods   Search

strategy

A comprehensive systematic literature search was conducted which included the findings of the study conducted from the following database such as Cochrane, Pubmed, Embase, and Medline. The published articles were selected based on the year of publication, studies among patients with type 1 diabetes, which are concern with improving the glycemic control of patients with type 1 diabetes by training on carbohydrate counting

Inclusion and exclusion criteria

All the published randomized control studies conducted on patients with type 1 diabetes which includes training on carbohydrate counting and its effect on glycemic control in patients with type 1 diabetes. Studies excluded were those which were not limited to type 1 diabetes, and with other study designs, case reports, case series short studies that were not full length articles.

Study screening and selection process

Following the compressive literature search, the titles and abstracts of selected studies were screened to identify studies for full –text retrieval. The studies included are based on inclusion criteria.

Data extraction

In the first analysis 82 articles (Cochrane 48 and Pubmed 34) were reviewed. After removing duplicates and screening the titles and abstracts 17 articles were selected for full text and 7 studies were selected which met the inclusion. The articles were categorized as per sample,

the instrument used to evaluate the outcome of study, the methodology and statistical analysis.

Statistical analysis

The outcome to be evaluated was determined based on changes in HbA1C level, adherence to the carbohydrate counting and regular follow up. A descriptive analysis of all included studies were performed differences between study populations, design, characteristics, interventions and outcome were evaluated.

Results- The literature search yielded 82 articles (Cochrane 48 and Pubmed 34) were reviewed. After removing duplicates and screening the titles and abstracts 17 articles were selected for full text and 7 studies were selected which met the inclusion 7 randomized control studies are included which are done patients with type 1 diabetes.

Conclusion-Carbohydrate counting is an important strategy in management of patients with type 1 diabetes .this study highlights on importance of training to the patients and caregivers regarding carbohydrate counting and its effect on glycemic control which helps in the management of patients with type 1 diabetes.

Discussion

This study suggests that training of carbohydrate counting to the patients with type 1 diabetes helps in improving glycemic control of patients with type 1 diabetes. The training can be given by dietician, Diabetologist, nurses who are trained in carbohydrate counting and insulin dose calculation. The studies not only showed improvement in glycemic control but also demonstrated the improvement in fasting and postprandial glucose levels decrease the incidence of hypoglycemic episodes and self dependent by patients and caregivers.

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Author /year Country	Design	Follow up	Sample size	Age	Type 1 duration in year	Intervention	Control	HBA1C at baseline (experimental and control group)	HBA1C after intervention (experimental and control group)
Sanjeev N.Mehta, Nicolle Quinn etal 2009 Boston	Corelational study	3 months	67	4-12 years	>1year	3 months after the training of carbohydrate counting assessment of knowledge of carbohydrate counting was done with glycemic control.	-	-	lower HbA1C (p=0.006) HbA1C level was 7.5 ± 0.8% (5.8-10.3%) only 4 children's had HbA1C more than 9%.
Viviane M Dias, Juliana A Pandini, et al 2010 Brazil	Randomized control study	3 months	51 Female-32 Male-19	10-60 years	>11 years	Balance diet prescribed using carbohydrate counting	-	10.40±0.33%	9.52±0.32% P=0.0009
Andrea Laurenzi, Andrea M. Bollaetal 2011 Italy	A randomized, prospective clinical trial	24 weeks	61 E-30 C-31	18 to 65 years	>3 months	Training on Carbohydrate counting by Diabetologist and dietician	Usual care	E-7.9 ±0.9 C-8.1±1.5 P=0.526	E-0.4 vs -0.05% C-0.35% P=0.05

Gail Spiegel , Andrey Bortsov 2012 Colorado	Randomiz ed control study	3 months	101 Male -41 Female-60	12-18 years	1 or more years	Education on carbohydrate counting	Hand out of carbohydrate content of commonly consumed food	Study -8.41 ± 0.19% Control-8.25±0.19%	8.22±01.8 P=012 Control-8.17±0.18 P=0.51
DamlaGoksen,Y aseminAtikAltin oketal 2014 Turkey	Randomiz er control study	2 years	84 E-52 C-32	7-18 years	>1 year	2 weeks programme of carb counting was conducted by team consists of Diabetologist, dietician and nurse, followed by weekly phone calls or hospital visits.	Nutritional and diabetic education at baseline and after 3 months	E-8.10 ±1.00 C-8.43 ±1.52 P=0.267	After 1 year E-7.58 ±0.97 C-8.01 ±1.20 P=0.118 After 2 years E-7.8 ± 1.38% C-8.76±1.77 p= 0.010)
Agnieszka Kowalska, KatarzynaPiecho wiak,et al 2017 Poland	Randomiz ed control study	26 weeks	282 Study-53 Control-53	< 18years	1 year	Use of ELKa toolset for carbohydrate counting	Short recall training of rules of exchange calculation & preparation of insulin dose	<10% (86mol/mol) Study-7.6(1) Control-7.4(1) P=0.283	13 week Study-7.2 (1.1) Control-7.6(1.1) P=0.085 26week Study-7.4 (1.2)

									Control-7.6(0.8) P=0.156
Jeffrey E Alfonsi1,2 , BEng, MD, FRCPC et al 2020 Canada	Randomized control study	3 months	46	8-18 years	>6 months	Use of iSpy carbohydrate counting app	Usual care	Study-8.41(1.84) Control-8.35 (1.32)	8.06 (1.43) Control-8.80 (1.60)

E-experimental group, C-control group