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Early management of type 2 diabetes: the way to regression or remission

Submission date	Recruitment status
26/04/2009	No longer recruiting
Registration date	**Overall study status**
29/05/2009	Completed
Last Edited	**Condition category**
10/07/2019	Nutritional, Metabolic, Endocrine

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol
Not provided at time of registration

Contact information

Type(s)
Scientific

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Study information

Scientific Title
Early management of type 2 diabetes: the way to regression or remission - a 3-year, prospective, randomised, clinic-based, interventional study with parallel groups

Study objectives
In subjects with undiagnosed type 2 diabetes, glucose levels increase gradually without symptoms over the course of 5 - 10 years. The importance of early diagnosis and treatment of the hyperglycaemia is already known in European Standards of General Practitioners. Lifestyle

intervention (diet and exercise) reduced the diabetes risk by up to 58%. The concept of "Metabolic Memory" also suggests the need of early aggressive treatment aiming to "normalise" metabolic control.

There are controversies about SMBG in patients non-insulin treated with type 2 diabetes. The rationale for using SMBG is that it reveals the immediate impact of various behaviours on blood glucose, helps physicians and patients to tailor treatment to avoid post-prandial hyperglycaemic excursion and detect hypoglycaemia. SMBG may be also used as an educational tool to increase compliance with treatments. However, the contribution of SMBG in newly diagnosed non-insulin-treated type 2 diabetes remains to be known.

Hypothesis:
Self monitoring of blood glucose (SMBG) based pharmacologic intervention may be advantageous as compared to conventional HbA1c algorithms in the treatment of newly diagnosed type 2 diabetes.

Ethics approval required
Old ethics approval format

Ethics approval(s)
St Carlos Hospital Ethic Committee approved on 13th January 2007

Primary study design
Interventional

Study design
Prospective randomised interventional study with parallel groups

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Type 2 diabetes

Interventions
Eligible newly diagnosed type 2 diabetes mellitus patients were randomised (2:1) to receive either a lifestyle intervention and SMBG as an educational tool and in order to apply step-by-step pharmacologic treatment, or to standard treatment based in HbA1c values without SMBG, by family physicians at primary care level. All patients were also treated with metformin 850 mg (1/2-0-1/2).

If allocated to the lifestyle intervention and SMBG group, patients were distributed (1:1) into two groups: with or without an exercise-supervised program at hospital. Adjustments were made for age, body mass index, and HbA1c values.

SMBG Group:
Patients attended a structured education program of 1-hour duration in order to learn how to perform the SMBG and collect data; these abilities were revised each visit. A 6-point profile, before and 2-hours after breakfast, lunch and dinner, every 3 days was recommended at baseline and after any pharmacological change. If fasting blood glucose (FBG) was greater than 110 mg /dl and 2-hour post-prandial blood glucose (2-hPBG) was greater than 145 mg/dl, then action

was taken to initiate or change the therapy. This means achieving a mean glycaemia less than 125 mg/dl, similar to HbA1c value less than 6%. After stabilisation, one profile every two weeks was recommended if patients were on metformin and/or metformin and pioglitazone treatment alone, or at least one profile a week if they received treatment other than metformin and/or pioglitazone.

HbA1c Group:
After lifestyle recommendation all diabetic patients were on metformin treatment and received other pharmacologic treatment based around HbA1c values every 3 - 6 months. The target was HbA1c less than 6.5%. SMBG would be started when Family Physicians considered it acceptable, and always with insulin treatment.

Lifestyle intervention:
This was performed in a 2-hour session aimed to achieve a lifestyle score greater than 12. The intervention was reinforced in each visit and score recorded. Lifestyle exercise-supervised programme was performed during 8 weeks in the Rehabilitation Unit at the St Carlos University Hospital after diagnosis of type 2 diabetes mellitus, and reinforced during 1-hour sessions at the end of the supervised period, 3 and 6 months later. Supervised physical activity programme consisted in a combined supervised aerobic and resistance training of 50 - 60 minutes per session, four days a week: two days at the Hospital and other two days at home, for eight weeks. The physical activity included a proper warm-up and cool-down period, 20 minutes of cycling at moderate intensity and 20 minutes resistance training with 3 sets ranging from 10 repetitions, for all main muscle groups. In addition, all patients were encouraged to increase daily physical activities, mainly brisk walking and climbing stairs. Adherence to lifestyle intervention will be estimated after the lifestyle questionnaire is applied. The aim is to achieve a score greater than 12.

Follow-up:
Newly diagnosed type 2 diabetic patients from the SMBG Group will be followed-up every 2 weeks or more during the first 3 months in order to show five SMBG profiles, and then each 3 months during 3 years. Patients from the HbA1c Group will be followed-up between 3 and 6 months during 3 years. Clinical and laboratory data, including body weight, waist circumference, blood pressure values and insulin, homeostatic model assessment (HOMA), cytokines, lipid profile and albumin-to-creatinine ratio first morning urine sample values will be performed at 3, 6, 12, 24 and 36 months.

Intervention Type
Other

Phase
Not Applicable

Primary outcome(s)
To estimate the remission and regression rate of type 2 diabetes mellitus:
1. Regression is considered yearly and established when patients achieved HbA1c less than 6% on metformin treatment and have normal levels of:
1.1. Fasting plasma insulin (9 - 26)
1.2. HOMA (1 - 3)
1.3. FPG less than 100 mg/dl
2. Remission is considered yearly and established when patients achieved HbA1c less than 6.5% with metformin and other pharmacological treatment

Key secondary outcome(s)
Estimate changes in:
1. HbA1c
2. Insulin
3. HOMA
4. Total (HDL and LDL) cholesterol
5. Triglycerides
6. Apolipoprotein B
7. Cytokines
8. Body weight
9. Waist circumference
10. Blood pressure

An intermediate analysis after the first year of follow-up was performed to assess the adherence to changes in lifestyle.

Completion date
31/12/2010

Eligibility

Key inclusion criteria
1. Newly diagnosed type 2 diabetes after two fasting glucose plasma values greater than 125 mg /dl between January 2006 and December 2007
2. Aged between 18 and 80 years, either sex
3. Less than 6 months of duration from the first fasting plasma glucose value less than 126 mg/dl
4. Absence of ketones in two first morning urine samples

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 Years

Sex
All

Total final enrolment
195

Key exclusion criteria

1. More than 6 months of the first fasting glucose level greater than 125 mg/dl
2. Ketones positives in urine samples
3. Unable to perform SMBG
4. Presence of a severe disease

Date of first enrolment
01/01/2006

Date of final enrolment
31/12/2010

Locations

Countries of recruitment
Spain

Study participating centre
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Sponsor information

Organisation
St Carlos Hospital (Hospital Clinico San Carlos) (Spain)

ROR
https://ror.org/04d0ybj29

Funder(s)

Funder type
Government

Funder Name
Health Ministry of Spain (Spain) - Cohesion Funds 2008

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary

Not provided at time of registration

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	results	01/08/2013	10/07/2019	Yes	No