

# Factors associated with HbA<sub>1c</sub> and weight changes in the Association of British Clinical Diabetologists (ABCD) nationwide GLP-1 agonists audit

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## Introduction

- Treatment with glucagon-like peptide-1 receptor agonists (GLP-1RAs) in type 2 diabetes has the advantage of weight loss but they are not effective in every patient. Clinical indicators that help predict response to treatment are needed.
- ABCD conducted two nationwide audits on the use of exenatide and liraglutide, based in real-life clinical practice.

## Aims

- To identify factors that were associated with HbA<sub>1c</sub> and weight changes with GLP-1RA treatment.

## The ABCD nationwide exenatide and liraglutide audits

- Exenatide audit: 126 centres with 6717 patients.
- Liraglutide audit: 77 centres with 4129 patients (ongoing).
- Collected anonymised data of patients treated with exenatide or liraglutide in the UK
  - patient age, gender, diabetes duration, ethnicity;
  - diabetes medications;
  - HbA<sub>1c</sub>, weight;
  - lipids;
  - blood pressure;
  - adverse events and GLP-1RA discontinuation.

## Methods

- Patients from both audits pooled together for analyses.
- HbA<sub>1c</sub> and weight reduction at 3 months (±6 weeks) analysed as response variables.
- Tested against other variables in univariate analyses.
- Continuous variables
  - Baseline HbA<sub>1c</sub>, baseline weight, HbA<sub>1c</sub> or weight reduction at 3 months, age, diabetes duration, total daily insulin dose (log-transformed), insulin dose reduction.
- Categorical variables
  - Gender (male/female), insulin use (Yes/No)
  - Ethnicity (Caucasian/South Asian/Afro-Caribbean), number of oral hypoglycaemic agents (OHAs) among non-insulin patients, OHA change (reduced/unchanged/increased).
- Variables with significant association ( $p < 0.05$ ) in univariate analyses entered into stepwise multivariate regression analyses.
- Two multivariate models
  - Model 1: all patients with relevant data
  - Model 2: insulin-treated patients with variables of baseline total insulin dose and insulin dose reduction.

## Results

### HbA<sub>1c</sub> reduction: univariate analyses

	Correlation coefficient, T- or F-values	p-value
Continuous variables		
Baseline HbA <sub>1c</sub>	0.433	<0.001
Baseline weight	-0.062	<0.001
Weight reduction	-0.112	<0.001
Age	0.003	0.819
Diabetes duration	-0.097	<0.001
Insulin dose (log transformed)	-0.054	0.042
Insulin dose reduction	-0.156	<0.001
Categorical variables		
Gender (male/female)	-1.42	0.157
Insulin use (Yes/No)	-9.59	<0.001
Ethnicity	6.64	0.001
Number of OHA	16.04	<0.001
SU reduction	-4.18	0.015
TZD reduction	-20.68	<0.001
DPP-4 reduction	-4.07	0.017

DPP-4, dipeptidyl peptidase-4; OHA, oral hypoglycaemic agents; SU, sulphonylurea; TZD, thiazolidinedione.

### Weight reduction: univariate analyses

	Correlation coefficient, T- or F-values	p-value
Continuous variables		
Baseline HbA <sub>1c</sub>	-0.126	<0.001
Baseline weight	0.200	<0.001
HbA <sub>1c</sub> reduction	-0.112	<0.001
Age	0.058	<0.001
Diabetes duration	0.101	<0.001
Insulin dose (log transformed)	0.025	0.345
Insulin dose reduction	0.225	<0.001
Categorical variables		
Gender (male/female)	-0.98	0.326
Insulin use (Yes/No)	3.49	<0.001
Ethnicity	10.43	<0.001
Number of OHA	11.56	<0.001
SU reduction	3.30	0.037
TZD reduction	8.55	<0.001
DPP-4 reduction	5.93	0.003

DPP-4, dipeptidyl peptidase-4; OHA, oral hypoglycaemic agents; SU, sulphonylurea; TZD, thiazolidinedione.

### HbA<sub>1c</sub> reduction: multivariate analyses

	Adjusted T-value	Adjusted p-value
Model 1 (2543 patients)		
Baseline HbA <sub>1c</sub>	24.88	<0.001
Insulin use	-9.93	<0.001
TZD reduction	-6.06	<0.001
Diabetes duration	-2.73	0.006
Baseline weight	-2.64	0.008
Ethnicity (South Asian worse)	-2.24	0.025
Model 2 (952 patients)		
Insulin dose (log transformed)	-4.52	<0.001
Insulin dose reduction	-5.43	<0.001

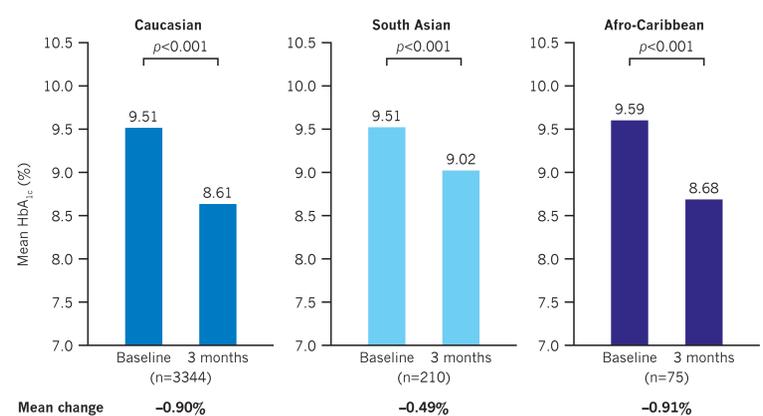
Model 1 accounted for 23.8% of the variance in HbA<sub>1c</sub> change. TZD, thiazolidinedione.

### Weight reduction: multivariate analyses

	Adjusted T-value	Adjusted p-value
Model 1 (2534 patients)		
Baseline weight	10.47	<0.001
Diabetes duration	3.68	<0.001
Baseline HbA <sub>1c</sub>	-5.63	<0.001
TZD reduction	5.92	<0.001
Insulin use	5.20	<0.001
Age	2.62	0.009
Model 2 (1112 patients)		
Insulin dose reduction	8.83	<0.001

Model 1 accounted for 7.6% and Model 2 12.6% of the variance in weight change. TZD, thiazolidinedione.

### HbA<sub>1c</sub> reduction at 3 months among different ethnic groups after GLP-1RA treatment.



## Conclusions

- Higher baseline HbA<sub>1c</sub> and baseline weight were associated with greater HbA<sub>1c</sub> and weight reductions, respectively.
- TZD reduction and insulin dose reduction had the anticipated effects on HbA<sub>1c</sub> and weight.
- Patients with longer diabetes duration, on insulin, with higher total daily insulin dose, who are heavier, and from a South-Asian ethnic background, had less HbA<sub>1c</sub> reduction.
- Patients on insulin, with greater age and longer diabetes duration had greater weight reduction.

## Acknowledgement

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## Disclosure

- The ABCD nationwide liraglutide audit programme has received grants from Eli Lilly and Novo Nordisk. This audit was independently initiated and performed by ABCD, and the authors remained independent in the analysis and writing of this report.