Original Article

Clinical experience with insulin detemir, biphasic insulin aspart and insulin aspart in people with type 2 diabetes: Results from the Chennai cohort of the A$_1$chieve study

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ABSTRACT

Background: The A$_1$chieve, a multicentric (28 countries), 24-week, non-interventional study evaluated the safety and effectiveness of insulin detemir, biphasic insulin aspart and insulin aspart in people with T2DM (n = 66,726) in routine clinical care across four continents. **Materials and Methods:** Data was collected at baseline, at 12 weeks and at 24 weeks. This short communication presents the results for patients enrolled from Chennai, India. **Results:** A total of 1334 patients were enrolled in the study. Four different insulin analogue regimens were used in the study. Patients had started on or were switched to biphasic insulin aspart (n = 983), insulin detemir (n = 205), insulin aspart (n = 42), basal insulin plus insulin aspart (n = 41) and other insulin combinations (n = 63). At baseline glycaemic control was poor for both insulin naïve (mean HbA$_1$c: 9.4%) and insulin users (mean HbA$_1$c: 9.3%) groups. After 24 weeks of treatment, both groups showed improvement in HbA$_1$c (insulin naïve: –2.1%, insulin users: –1.9%). SADRs including major hypoglycaemic events or episodes did not occur in any of the study patients. **Conclusion:** Starting or switching to insulin analogues was associated with improvement in glycaemic control with a low rate of hypoglycaemia.

Key words: A$_1$chieve study, Chennai, insulin analogues, type 2 diabetes mellitus

Introduction

62.4 million Indians were reported to have type 2 diabetes mellitus (T2DM) putting India on the forefront of diabetic epidemic across globe.[1,2] Fear of hypoglycaemia and gain in body weight are barriers for initiation of insulin therapy.[3] Modern insulin analogues are a convenient new approach or tool to glycaemic control, associated with low number of hypoglycaemia and favourable weight change.[4] A$_1$chieve, a multinational, 24-week, non-interventional study, assessed the safety and effectiveness of insulin analogues in people with T2DM (n = 66,726) in routine clinical care.[5] This short communication presents the results for patients enrolled from Chennai, India.

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Materials and Methods

Please refer to editorial titled: The A$_1$chieve study: Mapping the Ibn Battuta trail.

Results

A total of 1334 patients were enrolled in the study. The patient characteristics for the entire cohort divided as insulin-naïve and insulin users is shown in Table 1. Glycaemic control at baseline was poor in this population. The majority of patients (73.7%) started on or were switched to biphasic insulin aspart. Other groups were insulin detemir (n = 205), insulin aspart (n = 42), basal insulin plus insulin aspart (n = 41) and other insulin combinations (n = 63).

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After 24 weeks of treatment, overall hypoglycaemic events reduced in both insulin naïve (from 1.2 events/patient-year to 0.9 events/patient-year) and insulin user (from 2.9 events/patient-year to 2.5 events/patient-year groups. The hypoglycaemia incidence in insulin naive group at 24 weeks was lower than that observed in insulin users at baseline. SADRs including major hypoglycaemic events or episodes did not occur in any of the study patients. Blood pressure decreased from baseline, while overall lipid profile and quality of life improved at week 24 in the total cohort [Tables 2 and 3].

Table 1: Overall demographic data

Parameters	Insulin naïve	Insulin users	All
Number of participants	902	432	1334
Male *N* (%)	506 (56.1)	250 (58.0)	756 (56.7)
Female *N* (%)	396 (43.9)	181 (42.0)	577 (43.3)
Age (years)	52.7	56.4	53.9
Weight (kg)	68.7	70.8	69.4
BMI (kg/m^2)	25.9	27.4	26.4
Duration of DM (years)	8.3	13.5	10.0
No therapy			55
>2 OGLD	303	168	471
HbA$_1$c	9.4	9.3	9.4
FPG (mmol/L)	10.9	10.8	10.9
PPPG (mmol/L)	16.4	15.8	16.2
Macrovascular complications, *N* (%)	130 (14.6)	100 (23.1)	230 (17.4)
Microvascular complications, *N* (%)	571 (64.1)	335 (77.5)	906 (68.5)
Pre-study therapy, *N* (%)			
Insulin users			432 (32.4)
OGLD only			847 (63.5)
No therapy			55 (4.1)
Baseline therapy, *N* (%)			
Insulin detemir±OGLD			205 (15.4)
Insulin aspart±OGLD			42 (3.1)
Basal+insulin aspart±OGLD			41 (3.1)
Biphasic insulin aspart±OGLD			983 (73.7)
Others			63 (4.7)

BMI: Body mass index, OGLD: Oral glucose-lowering drug, HbA$_1$c: Glycated hemoglobin A$_1$c, FPG: Fasting plasma glucose, PPPG: Postprandial plasma glucose, DM: Diabetes mellitus

All parameters of glycaemic control improved from baseline to study end in the total cohort [Table 4]. Approximately 30.0% of patients achieved HbA$_1$c < 7.0% at week 24.

Biphasic insulin aspart ± OGLD

Of the total cohort, 983 patients started on biphasic insulin aspart ± OGLD, of which 683 (69.5%) were insulin naïve and 300 (30.5%) were insulin users. After 24 weeks of starting or switching to biphasic insulin aspart, hypoglycaemic events reduced in both insulin naïve (from 0.9 events/patient-year to 0.8 events/patient-year) and insulin user (from 2.6 events/patient-year to 2.2 events/patient-year) groups. Quality of life also improved by the end of the study [Tables 5 and 6].

All parameters of glycaemic control improved from baseline to study end in those who started on or were

Table 2: Overall safety data

Parameter	*N*	Baseline	Week 24	Change from baseline
Hypoglycaemia (insulin naïve), events/patient-year				
All	902	1.2	0.9	−0.3
Nocturnal		0.2	0.1	−0.1
Major		0.2	0.0	−0.2
Hypoglycaemia (insulin users), events/patient-year				
All	432	2.9	2.5	−0.4
Nocturnal		0.5	0.4	−0.1
Major		0.1	0.0	−0.1
Body weight, kg				
Insulin naïve	710	68.6	68.9	0.4
Insulin users	351	70.3	70.8	0.5
Lipids and BP (insulin naïve)				
LDL-C, mean (mmol/L), (*N*, % <2.5 mmol/L)	596	3.0 (193, 32.4)	2.6 (206, 45.7)	−0.5
HDL-C, mean (mmol/L), (*N*, % >1.0 mmol/L)	592	1.0 (314, 53.0)	1.1 (296, 66.1)	0.1
TG, mean (mmol/L), (*N*, % <2.3 mmol/L)	586	2.0 (414, 70.6)	1.6 (379, 91.3)	−0.4
SBP, mean (mmHg), (*N*, % <130 mmHg)	800	133.7 (260, 32.5)	128.0 (388, 48.1)	−5.7
Lipids and BP (insulin users)				
LDL-C, mean (mmol/L), (*N*, % <2.5 mmol/L)	361	2.7 (168, 46.5)	2.4 (163, 61.0)	−0.3
HDL-C, mean (mmol/L), (*N*, % >1.0 mmol/L)	363	1.0 (197, 54.3)	1.1 (176, 65.9)	0.0
TG, mean (mmol/L), (*N*, % <2.3 mmol/L)	358	2.0 (267, 74.6)	1.7 (232, 88.2)	−0.3
SBP, mean (mmHg), (*N*, % <130 mmHg)	409	137.3 (97, 23.7)	131.3 (124, 31.7)	−6.0
Quality of life, VAS scale (0-100)				
Insulin naïve	772	66.0	76.4	10.4
Insulin users	402	64.4	77.0	12.6

BP: Blood pressure, LDL-C: Low-density lipoprotein cholesterol, HDL-C: High-density lipoprotein cholesterol, TG: Triglycerides, SBP: Systolic blood pressure, VAS: Visual analogue scale

switched to biphasic insulin aspart for both insulin naïve and insulin user groups [Table 7].

Basal + insulin aspart ± OGLD

Of the total cohort, 41 patients started on basal + insulin aspart ± OGLD, of which 10 (24.4%) were insulin naïve and 31 (75.6%) were insulin users. After 24 weeks of treatment, hypoglycaemic events reduced from 2.9 events/patient-year to 2.4 events/patient-year in insulin user group whereas hypoglycaemia increased from 2.6 events/patient-year to 3.3 events/patient-year in insulin naïve group. Body weight decreased and quality of life improved after 24 weeks of treatment [Tables 8 and 9].

All parameters of glycaemic control improved from baseline to study end in those who started on or were switched to basal + insulin aspart ± OGLDs for both insulin naïve and insulin user groups [Table 10].

Insulin detemir ± OGLD

Of the total cohort, 205 patients started on insulin detemir ± OGLD, of which 167 (81.5%) were insulin naïve and 38 (18.5%) were insulin users. After 24 weeks of treatment, hypoglycaemic events reduced from

Table 3: Insulin dose

Insulin dose, U/day	*N*	Pre-study	*N*	Baseline	*N*	Week 24
Insulin naïve	0	0	902	19.9 (9.3)	833	20.5 (9.3)
Insulin users	432	28.8 (18.8)	432	31.8 (18.2)	405	28.8 (15.6)

Table 4: Overall efficacy data

Parameter	*N*	Baseline	Week 24	Change from baseline
Glycaemic control (insulin naïve)				
HbA$_1$c, mean (%)	815	9.4	7.3	−2.1
FPG, mean (mmol/L)	816	10.9	6.7	−4.2
PPPG, mean (mmol/L)	797	16.4	10.0	−6.5
Glycaemic control (insulin users)				
HbA$_1$c, mean (%)	401	9.3	7.4	−1.9
FPG, mean (mmol/L)	393	10.8	6.8	−4.0
PPPG, mean (mmol/L)	394	15.8	10.0	−5.8
Achievement of HbA$_1$c <7.0% at week 24				
Insulin naïve (% of patients)	831	31.3		
Insulin users (% of patients)	401	30.2		

HbA$_1$c: Glycated haemoglobin A$_1$c, FPG: Fasting plasma glucose, PPPG: Postprandial plasma glucose

Table 5: Biphasic insulin aspart±oral glucose-lowering drug safety data

Parameter	*N*	Baseline	Week 24	Change from baseline
Hypoglycaemia, events/patient-year				
Insulin naïve	683	0.9	0.8	−0.1
Insulin users	300	2.6	2.2	−0.4
Body weight, kg				
Insulin naïve	530	68.7	69.1	0.5
Insulin users	243	69.2	69.9	0.7
Quality of life, VAS scale (0-100)				
Insulin naïve	570	66.1	76.5	10.4
Insulin users	278	64.9	76.8	11.9

VAS: Visual analogue scale

Table 6: Insulin dose

Insulin dose, U/day	*N*	Pre-study	*N*	Baseline	*N*	Week 24
Insulin naïve	0	0	683	20.5	622	21.6
Insulin users	300	26.1	300	27.2	281	26.7

Table 7: Biphasic insulin aspart±oral glucose-lowering drug efficacy data

Parameter	*N*	Baseline	Week 24	Change from baseline
Glycaemic control (insulin naïve)				
HbA$_1$c, mean (%)	605	9.4	7.3	−2.1
FPG, mean (mmol/L)	612	10.9	6.8	−4.1
PPPG, mean (mmol/L)	593	16.5	10.1	−6.4
Glycaemic control (insulin users)				
HbA$_1$c, mean (%)	278	9.2	7.4	-1.8
FPG, mean (mmol/L)	274	10.7	6.8	-3.9
PPPG, mean (mmol/L)	276	15.8	10.0	-5.7

HbA$_1$c: Glycated haemoglobin A$_1$c, FPG: Fasting plasma glucose, PPPG: Postprandial plasma glucose

Table 8: Basal+insulin aspart±oral glucose-lowering drug safety data

Parameter	*N*	Baseline	Week 24	Change from baseline
Hypoglycaemia, events/patient-year				
Insulin naïve	10	2.6	3.3	0.7
Insulin users	31	2.9	2.4	−0.5
Body weight, kg				
Insulin naïve	4	69.9	69.4	−0.5
Insulin users	24	73.5	73.2	−0.2
Quality of life, VAS scale (0-100)				
Insulin naïve	6	65.0	79.5	14.5
Insulin users	27	63.3	77.1	13.8

VAS: Visual analogue scale

Table 9: Insulin dose

Insulin dose, U/day	*N*	Pre-study	*N*	Baseline	*N*	Week 24
Insulin naïve	0	0	10	40.4	8	36.9
Insulin users	31	45.4	31	63.0	27	47.3

2.6 events/patient-year to 1.0 events/patient-year in insulin naive group whereas hypoglycaemia increased from 1.7 events/patient-year to 2.5 events/patient-year in insulin users. Quality of life improved after 24 weeks of treatment [Tables 11 and 12].

All parameters of glycaemic control improved from baseline to study end in those who started on or were switched to insulin detemir ± OGLDs for both insulin-naïve and insulin user groups [Table 13].

Table 10: Basal+insulin aspart±oral glucose-lowering drug efficacy data

Parameter	*N*	Baseline	Week 24	Change from baseline
Glycaemic control (insulin naïve)				
HbA_1c, mean (%)	8	10.0	7.3	−2.6
FPG, mean (mmol/L)	7	13.1	7.0	−6.1
PPPG, mean (mmol/L)	7	19.4	10.4	−9.0
Glycaemic control (insulin users)				
HbA_1c, mean (%)	27	9.6	7.4	−2.2
FPG, mean (mmol/L)	26	11.9	6.5	−5.4
PPPG, mean (mmol/L)	26	17.1	8.8	−8.3

HbA_1c: Glycated haemoglobin A_1c, FPG: Fasting plasma glucose, PPPG: Postprandial plasma glucose

Table 11: Insulin detemir±oral glucose-lowering drug safety data

Parameter	*N*	Baseline	Week 24	Change from baseline
Hypoglycaemia, events/patient-year				
Insulin naïve	167	2.6	1.0	−1.6
Insulin users	38	1.7	2.5	0.8
Body weight, kg				
Insulin naïve	139	68.6	68.6	0.0
Insulin users	27	69.8	70.2	0.3
Quality of life, VAS scale (0-100)				
Insulin naïve	157	65.6	75.8	10.2
Insulin users	37	63.5	76.2	12.7

VAS: Visual analogue scale

Table 12: Insulin dose

Insulin dose, U/day	*N*	Pre-study	*N*	Baseline	*N*	Week 24
Insulin naïve	0	0	167	13.5	162	14.1
Insulin users	38	18.2	38	14.4	37	16.4

Table 13: Insulin detemir±oral glucose-lowering drug efficacy data

Parameter	*N*	Baseline	Week 24	Change from baseline
Glycaemic control (insulin naïve)				
HbA_1c, mean (%)	162	9.3	7.3	−2.0
FPG, mean (mmol/L)	158	10.9	6.4	−4.5
PPPG, mean (mmol/L)	158	15.7	9.6	−6.1
Glycaemic control (insulin users)				
HbA_1c, mean (%)	37	9.0	7.3	−1.7
FPG, mean (mmol/L)	36	9.7	6.7	−3.0
PPPG, mean (mmol/L)	36	13.8	9.9	−3.9

HbA_1c: Glycated haemoglobin A_1c, FPG: Fasting plasma glucose, PPPG: Postprandial plasma glucose

Insulin aspart ± OGLD

Of the total cohort, 42 patients started on insulin aspart ± OGLD, of which 29 (69.0%) were insulin naïve and 13 (31.0%) were insulin users. After 24 weeks of treatment, hypoglycaemic events reduced from 19.0 events/patient-year to 6.5 events/patient-year in insulin user group whereas hypoglycaemia increased from 0.0 events/patient-year to 0.5 events/patient-year in insulin naïve group. Body weight decreased and quality of life improved after 24 weeks of treatment [Tables 14 and 15].

All parameters of glycaemic control improved from baseline to study end in those who started on or were switched to insulin aspart ± OGLDs for both insulin naïve and insulin user groups [Table 16].

Conclusion

Our study reports improved glycaemic control and quality of life following 24 weeks of treatment with any of the insulin analogues (biphasic insulin aspart; basal + insulin aspart; insulin detemir; insulin aspart) with or without OGLD. SADRs including major

Table 14: Insulin aspart±oral glucose-lowering drug safety data

Parameter	*N*	Baseline	Week 24	Change from baseline
Hypoglycaemia, events/patient-year				
Insulin naïve	29	0.0	0.5	0.5
Insulin users	13	19.0	6.5	12.5
Body weight, kg				
Insulin naïve	28	66.1	66.0	−0.1
Insulin users	12	76.0	75.2	−0.8
Quality of life, VAS scale (0-100)				
Insulin naïve	27	66.5	78.4	11.9
Insulin users	12	63.5	78.6	15.1

VAS: Visual analogue scale

Table 15: Insulin dose

Insulin dose, U/day	*N*	Pre-study	*N*	Baseline	*N*	Week 24
Insulin naïve	0	0.0	29	25.3	29	24.7
Insulin users	13	43.9	13	41.2	12	32.3

Table 16: Insulin aspart±oral glucose-lowering drug efficacy data

Parameter	*N*	Baseline	Week 24	Change from baseline
Glycaemic control (insulin naïve)				
HbA$_1$c, mean (%)	28	9.1	7.2	−1.9
FPG, mean (mmol/L)	29	9.3	6.2	−3.1
PPPG, mean (mmol/L)	29	17.2	9.9	−7.2
Glycaemic control (insulin users)				
HbA$_1$c, mean (%)	11	9.4	7.8	−1.6
FPG, mean (mmol/L)	12	11.4	7.0	−4.4
PPPG, mean (mmol/L)	11	14.0	11.1	−2.9

HbA$_1$c: Glycated haemoglobin A$_1$c, FPG: Fasting plasma glucose, PPPG: Postprandial plasma glucose

hypoglycaemic events or episodes did not occur in any of the study patients. A slight increase in body weight was noted for overall cohort. Though the findings are limited by number of patients, still the trend indicates that insulin analogues can be considered effective and possess a safe profile for treating type 2 diabetes in Chennai, India.

References

1. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030. Diabetes Care 2004;27:1047-53.
2. Shetty P. Public health: India's diabetes time bomb. Nature 2012;485:S14-6.
3. Korytkowski M. When oral agents fail: Practical barriers to starting insulin. Int J Obes Relat Metab Disord 2002;26 Suppl 3:S18-24.
4. Hirsch IB. Insulin analogues. N Engl J Med 2005;352:174-83.
5. Shah SN, Litwak L, Haddad J, Chakkarwar PN, Hajjaji I. The A$_1$chieve study: A 60 000-person, global, prospective, observational study of basal, meal-time, and biphasic insulin analogs in daily clinical practice. Diabetes Res Clin Pract 2010;88 Suppl 1:S11-6.

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