Saint Barnabas Medical Center

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Comparison of glucagon-like peptide-1 receptor agonists versus sodium-glucose co-transporter 2 inhibitors added to basal insulin analogues in patients with type 2 diabetes

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Background

- Sodium-glucose co-transporter 2 inhibitors (SGLT2 i) entered the market in 2013 following the earlier entry of glucagon-like peptide-1 receptor agonists (GLP-1 RA) in 2005.[1,2]
- SGLT2 i's work by inhibiting SGLT2 in the proximal convoluted tubule of the nephron, producing glycosuria and preventing glucose reabsorption.[3]
- GLP-1 RA's exert their mechanism via a glucose-dependent pathway involving an increase in insulin secretion, suppression of glucagon excretion, increase in satiety and slowing of gastric emptying. This combination of mechanisms work synergistically to lower A1C as well as promoting weight loss.[1]
- Previous trials have assessed SGLT2 i's versus GLP-1 RA's in addition to metformin with or without other oral antidiabetics while excluding patients utilizing insulin.[1,2]
- No direct comparison of GLP-1 RA's versus SGLT2 i's in addition to basal insulin analogues has been completed while taking into account the effectiveness (i.e. real world relevance) of interventions.[4,5]

Objective

- The objective of the study is to compare A1C lowering of GLP-1 RA's versus SGLT-2 i's in addition to basal insulin analogues with or without other oral antidiabetic agents in patients with type 2 diabetes mellitus.

Methods

- Institutional Review Board-approved retrospective chart review of patients who were part of the Internal Medicine Faculty Practice from January 1, 2016 to August 1, 2019
- **Primary Outcome**: percent change in A1C at 9 months after initiation of an SGLT-2 i or GLP-1 RA added to a basal insulin analogue
- **Secondary Outcomes**: percent change in BMI, percent change in daily units of basal insulin analogue, and discontinuation rate of basal insulin analogue at 9 months
- **Inclusion Criteria**: age 18–90 years, BMI ≥ 20 kg/m², diagnosis of type 2 diabetes mellitus, A1C ≥ 7.5% and the concurrent use of basal insulin analogue with or without oral anti-diabetics with the exception of SGLT-2 i's, and initiation of SGLT-2 i or GLP-1 RA within the study period
- **Exclusion Criteria**: treatment with weight management or similar over-the-counter (OTC) therapies within 90 days prior to initiating therapy, pregnancy, or breastfeeding
- **Statistical Methods**: Mann-Whitney U test for continuous data

Results

Table 1: Baseline Characteristics

Baseline Characteristics	SGLT2 i (n=4)	GLP-1 RA (n=19)
Age — year, median ± SD	57 ± 13	60 ± 15
Male sex — no. (%)	2 (50)	12 (63)
BMI — kg/m², median ± SD	29.3 ± 4.4	32.6 ± 8.3
A1C — %, median ± SD	9.9 ± 2.2	11.0 ± 2.3
Comorbidities — no., median ± SD	3.0 ± 0.4	4.0 ± 1.5
Daily basal insulin analogue — units, median ± SD	42.0 ± 33.8	26.0 ± 15.5
Race — no. (%)		
Black or African American	3 (75)	7 (37)
White	1 (25)	5 (26)
Asian	0 (0)	2 (10)
Other	0 (0)	2 (10)
Patient declined	0 (0)	3 (16)
Smoker status — no. (%)		
Current	0 (0)	0 (0)
Former	1 (25)	7 (37)
Never	3 (75)	12 (63)
Therapy added — no. (%)		
Empagliflozin	4 (100)	-
Liraglutide	-	10 (53)
Lixisenatide	-	5 (26)
Albiglutide	-	2 (11)
Other	-	2 (11)
Combination therapy added — no. (%)	1 (25)	7 (37)

Table 2: Outcome Characteristics

	SGLT2 i (n=4)	GLP-1 RA (n=19)
A1C — %, median ± SD	8.7 ± 1.3	7.4 ± 1.5
BMI — kg/m², median ± SD	29.6 ± 5.9	29.8 ± 8.6
Daily basal insulin analogue — units, median ± SD	42.0 ± 32.9	34.0 ± 18.4
Discontinuation rate of basal insulin analogue — no. (%)	1 (25)	1 (5.3)

Key: **SD**=standard deviation, **BMI**=body-mass index, **no.**=number

Figure 1: Percent change in A1C in SGLT2 i and GLP-1 RA group, 9 months

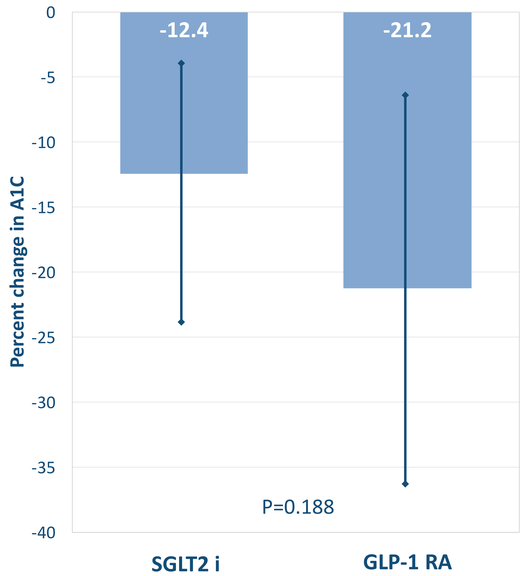
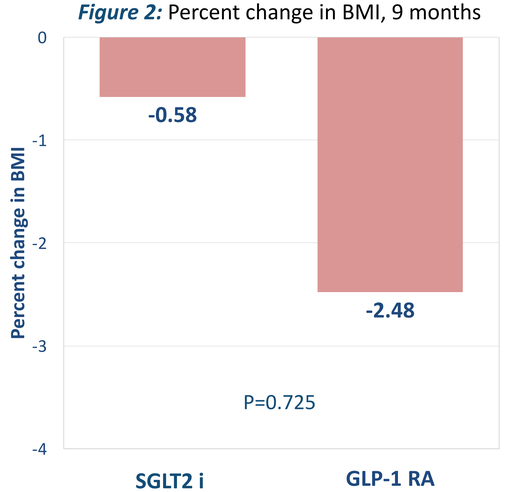


Figure 2: Percent change in BMI, 9 months



Results

A total of 118 patient charts were reviewed and 23 met the inclusion criteria

Primary Outcome

- Percent change in A1C at 9 months, median ± SD (%)
  - SGLT2 i: −12.4 ± 8.3
  - GLP-1 RA: −21.2 ± 15
  - P=0.188

Secondary Outcomes

- Percent change in BMI at 9 months, median ± SD (%)
  - SGLT2 i: −0.58 ± 7.1
  - GLP-1 RA: −2.48 ± 5.1
  - P=0.725
- Percent change in daily units of basal insulin analogue at 9 months, median ± SD (%)
  - SGLT2 i: −11.4 ± 76.9
  - GLP-1 RA: 40.7 ± 60.8
  - P=0.330
- Discontinuation rate of basal insulin analogue at 9 months
  - SGLT2 i: 1/4 (25%)
  - GLP-1 RA: 1/19 (5.3%)

Limitations

- Small sample size with unbalanced groups
- Retrospective chart review
- Electronic medical records consisting of incomplete and inconsistent patient information

Conclusion

The use of SGLT2 i's and GLP-1 RA's as an add-on therapy to basal insulin analogues has the benefit of lowering a patient's A1C. GLP-1 RA's and SGLT2 i's reduce A1C and BMI, but meaningful conclusion cannot be drawn due to the small sample size. Change in daily basal insulin units has a considerable variance amongst the two groups due to the small sample size as well. A larger prospective study would be required to further explore the findings when directly comparing SGLT2 i versus GLP-1 RA in addition to basal insulin analogue.

References

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Disclosure

Authors of this poster have nothing to disclose