

# Prevalence of hypercortisolism in Type 2 Diabetes patients: a systematic review and meta-analysis

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**Background:** Type 2 Diabetes and Cushing's syndrome share clinical characteristics such as insulin resistance, hyperglycemia, hypertension, dyslipidemia and obesity. Several small studies have recorded a high prevalence of hypercortisolism in T2D. This could have therapeutic implications.

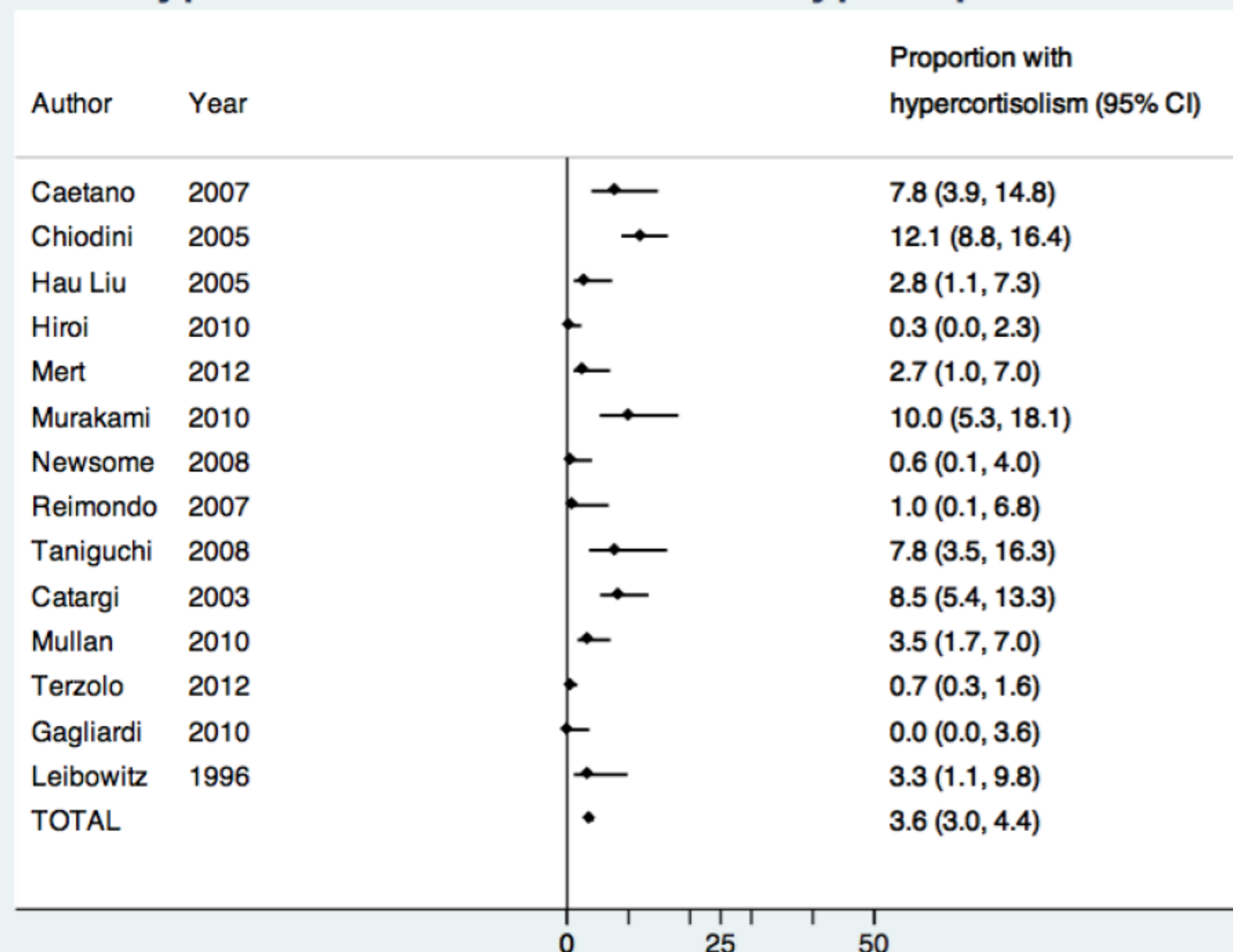
## Objectives

- To perform a systematic review and meta-analysis on the prevalence and clinical characteristics of endogenous hypercortisolism in T2D patients.

## Methods

- Original articles assessing the prevalence of endogenous hypercortisolism in T2D were eligible.
- A search was performed in SCOPUS, MEDLINE and EMBASE.
- Data were pooled in a random effects logistic regression model and reported with 95% confidence intervals (95% CI).

## Hypercortisolism in diabetes type 2 patients



## Characteristics of included articles

Author	Number of diabetic participants	M/F	Number of patients with hypercortisolism	Test used, number of positives (%)						Pituitary adenoma	Adrenal adenoma	Ectopic adenoma
				MSC	MPC	OD	LDDST	ACTH elevated	UFC			
1 Leibowitz <i>et al</i> , 1996	90 (100%)	26/64	3 (3.3%)	-	-	4 (4.4%)	3 (3.3%)	0 (0%)	3 (3.3%)	2 (2.2%)	1 (1.1%)	0 (0%)
2 Catargi <i>et al</i> , 2003	200 (100%)	49/151	17 (8.5%)	2 (1%)	17 (8.5%)	52 (26%)	-	-	17 (8.5%)	3 (1.5%)	8 (4%)	0 (0%)
3 Chiodini <i>et al</i> , 2005	289 (100%)	124/165	35 (12.1%)	-	-	51 (17.6%)	-	5 (1.7%)	8 (2.7%)	4 (1.4%)	21 (7.1%)	2 (0.7%)
4 Hau Liu <i>et al</i> , 2005	141 (100%)	141/0	4 (2.8%)	28 (19.9%)	-	-	4 (2.8%)	3 (2.1%)	1 (0.7%)	0 (0%)	0 (0%)	0 (0%)
5 Caetano <i>et al</i> , 2007	103 (100%)	34/69	8 (7.8%)	12 (11.7%)	-	29 (28.2%)	1 (0.9%)	2 (1.9%)	0 (0%)	1 (0.9%)	4 (3.9%)	0 (0%)
6 Reimondo <i>et al</i> , 2007	100 (100%)	67/37	1 (1%)	-	1 (1%)	5 (5%)	1 (1%)	1 (1%)	1 (1%)	1 (1%)	0 (0%)	0 (0%)
7 Newsome <i>et al</i> , 2008	171 (100%)	102/69	1 (0.6%)	-	-	31 (18.1%)	-	-	3 (1.8%)	0 (0%)	0 (0%)	0 (0%)
8 Taniguchi <i>et al</i> , 2008	77 (100%)	47/30	6 (7.8%)	-	27 (35%)	7 (9%)	-	6 (7.8%)	-	2 (2.6%)	0 (0%)	0 (0%)
9 Gagliardi <i>et al</i> , 2010	100 (100%)	60/40	0 (0%)	3 (3%)	0 (0%)	0 (0%)	-	0 (0%)	0 (0%)	-	-	-
10 Hiroi <i>et al</i> , 2010	304 (100%)	181/123	1 (0.3%)	-	-	1 (0.3%)	1 (0.3%)	1 (0.3%)	0 (0%)	0 (0%)	14 (4.6%)	0 (0%)
11 Mullan <i>et al</i> , 2010	201 (100%)	119/91	7 (3.5%)	47 (23%)	-	7 (3.5%)	0 (0%)	-	0 (0%)	0 (0%)	0 (0%)	0 (0%)
12 Murakami <i>et al</i> , 2010	90 (100%)	53/37	9 (10%)	-	57 (63.3%)	9 (10%)	-	0 (0%)	-	-	-	-
13 Mert <i>et al</i> , 2012	148 (100%)	35/113	4 (2.6%)	-	-	9 (6.2%)	4 (2.6%)	-	-	2 (1.4%)	2 (1.4%)	0 (0%)
14 Terzolo <i>et al</i> , 2012	813 (100%)	428/385	6 (0.7%)	-	-	40 (4.9%)	6 (0.7%)	1 (0.12%)	-	0 (0%)	3 (0.4%)	-

## Results

- Fourteen articles were included, with a total of 2827 T2D patients.
- The pooled prevalence of hypercortisolism was 3.6% [95% CI: 3.0-4.4].
- The prevalence did not differ between studies of unselected patients and patients selected based on presence of metabolic features such as obesity or poor glycemic control ( $p=0.41$  from meta-regression).
- Imaging in patients with hypercortisolism ( $n=102$ ) revealed adrenal tumors and pituitary tumors in 14 % and 52 %, respectively.

## Conclusion

- Hypercortisolism is a relatively frequent finding in T2D.
- A substantial proportion of the cases also presented with adrenal or pituitary neoplasia, which could provide the basis for surgical intervention.
- These findings should not be ignored and controlled trials should be considered.

EP - 70

Acknowledgements: The Danish Centre For Strategic Research in Type 2 Diabetes Project

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