

Prevalence of contact dermatitis to glucose sensors in pediatric population and the main allergens involved

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Diabetes mellitus (DM) is a disease affecting up to 14% of the population in Spain.¹ Type I DM is characterized by early onset; traditional management is based on the administration of subcutaneous insulin. In recent years, the use of insulin infusion pumps along with a corresponding sensor has become widespread, owing to the more precise and sustained control of glycaemia. Thus, contact dermatitis caused by glucose sensors has become an increasing problem.²⁻⁵

Methods

We present the prevalence of adverse reactions in children with type I DM who were equipped with glucose sensors. Between March 2019 and February 2020, we followed the patients who consecutively consulted a pediatric endocrinology clinic for reviewing of their sensors. A total of 275 sensors (189 FreeStyle, 37 Enlite, 36 Dexcom G6, and 14 Dexcom G5) were evaluated in 264 type I DM patients. A total of 19 cutaneous reactions

(6.9%) to glucose sensors in 14 patients (5.3%) were detected. Four patients reacted to more than one device, and 1 reaction occurred before March 2019. Age, previous history of atopy, patch test results and alternative glucose sensor used^{6,7} are summarized in table 1. Patch testing was performed in all patients using the TRUE Test (Smartpractice, Phoenix, Arizona), and acrylate series as well as isobornyl acrylate (IBOA) 0.1% pet. (Chemoteqnique Diagnostics, Vellinge, Sweden) and additional materials according to the composition of the different devices involved in the reactions.²⁻⁵ Patch tests were applied on the upper back for 2 days using Curatest. A piece of adhesive material of the implicated sensor was tested “as is”. Readings were performed at day (D) 2 and D4 according to the International Contact Dermatitis Research Group Guidelines.

Results

In our population, 6.9% of the reactions to glucose sensors (equivalent to 5.3% of the patients) developed allergic contact dermatitis. FreeStyle was the device causing most of the reactions (11 out of 19), and IBOA was the main allergen involved in those reactions (7/19), followed by colophonium (1/19) and ethylcyanoacrylate (1/19).

Discussion

The results of this work demonstrate the high prevalence of allergic contact dermatitis in children with type I DM who use glucose sensors. As described previously,^{2,3} IBOA is the culprit allergen involved in these reactions. All healthcare workers who are involved in the use of these devices should bear this concern in mind. Furthermore, we have to

face the unwillingness of the manufacturers to provide, in a detailed way, the list of substances used in these devices, which adds more difficulty to identifying the culprit allergen.

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Table 1: Demographic characteristics and results of patch tests.

Case	Age (years)	Sex	Atopic Dermatitis	Sensor causing dermatitis	Onset of dermatitis after first use (months)	Patch test results							Medical device alternative
						IBOA 0,1% pet.	Colophonium	Ethyl cyanoacrylate	Freestyle adhesive	Dexcom adhesive	Enlite adhesive	Other positivities (TRUE Test and Acrylates)	
1	9	M	Yes	Dexcom G4 platinum Enlite Freestyle Libre	9 2 24	+++/ ++	-/-	++/+++	+++/ +++	G4/5 and G6: -/-	-/-	Methyl methacrylate -/+	Eversense
2	13	M	Yes	Freestyle Libre	2	+++/ ++	-/-	-/-	-/++	NT	NT	None	Finger prick
3	17	F	Yes	Freestyle Libre Enlite	1 1	+++/ ++	-/-	-/-	+/ ++	NT	-/-	Cobalt dichloride +++/ +++	Dexcom G5
4	8	F	No	Freestyle Libre	5	++/ ++	-/-	-/-	+/ +	NT	NT	Gold sodium thiosulfate ++/ +++	Dexcom G6
5	5	F	Yes	Freestyle Libre	1	+/ +++	-/-	-/-	-/-	NT	NT	None	Dexcom G5
6	7	M	Yes	Freestyle Libre	1	-/-	-/-	-/-	++/ ++	G4/5 and G6: -/-	NT	Potassium dichromate - /+ Fragrance mix -/++ Paraben mix -/+ Cobalt dichloride -/+	Dexcom G6
7	9	M	No	Freestyle Libre	15	-/-	++/ ++	-/-	-/-	NT	NT	None	Dexcom G5
8	10	M	Yes	Freestyle Libre	1	-/-	-/-	-/-	-/-	NT	NT	None	Enlite
9	8	F	No	Freestyle Libre Enlite	1 1	-/-	-/-	-/-	-/-	G4/5 and G6: -/-	-/-	Cl+Me- Isothiazolinone +++/ +++ (Kathon)	Enlite + 3M Cavilon
10	4	F	No	Freestyle Libre	24	-/-	-/-	-/-	-/-	NT	NT	None	Freestyle (well tolerate after summer)
11	5	M	Yes	Freestyle Libre	12	-/-	-/-	-/-	-/-	NT	NT	None	Freestyle Libre + 3M Cavilon
12	9	M	No	Enlite	36	-/-	++/ ++	-/-	-/-	G4/5 and G6: -/-	+/ ++	Fragrance mix +/+	Dexcom G6
13	8	F	No	Enlite	24	-/-	-/-	-/-	NT	NT	++/ +++	None	Dexcom G5
14	6	F	Yes	Dexcom G5 Dexcom G6	1 1	-/-	-/-	-/-	NT	G4/5 and G6: -/-	NT	None	Dexcom G6 + 3M Cavilon

Abbreviations: F: female; IBOA: isobornyl acrylate; M: male; NT: not tested