Published in final edited form as:

Pediatr Dermatol. 2017 March ; 34(2): 197–198. doi:10.1111/pde.13056.

A cross-sectional study evaluating skin, hair, nail and bone disease in patients with Focal Dermal Hypoplasia

Nicole S. Gunasekera, BA^{1,3}, Joan K. Divito, BS¹, Thomas S. Kupper, MD^{1,3}, Jennifer Huang, MD^{2,3}, and Sherrie J. Divito, MD, PhD^{1,3}

¹Department of Dermatology, Brigham and Women's Hospital, Boston, MA 02115

²Program in Dermatology, Division of Allergy and Immunology, Boston Children's Hospital, Boston, MA 02115

³Harvard Medical School, Boston, MA 02115

Abstract

Focal Dermal Hypoplasia (FDH) is an X-linked dominant disease characterized by dermal thinning and fat herniation, with other ectodermal and mesodermal abnormalities. There is limited literature regarding symptomatology and progression of skin, hair and nail disease. Risk of bone fragility too has not been explored. This cross-sectional survey-based study explores these gaps in knowledge, and provides direction for future avenues of research in FDH.

Keywords

focal dermal hypoplasia; goltz syndrome; genodermatosis

Focal dermal hypoplasia (FDH) is an X-linked dominant disease of ectodermal and mesodermal tissues, without any definitive treatment.^{1–5} FDH is characterized by dermal hypoplasia with additional skin, hair and nail involvement possible. Current literature is limited regarding integumentary symptoms and disease progression. FDH can also manifest in multiple other organ systems including bone.^{1,2,5} Whether FHD patients are predisposed to bone fragility is unknown.¹

We designed a cross-sectional study based on a 30-item questionnaire to investigate skin, hair, nail and bone disease in FDH patients, which was administered at the National Foundation for Ectodermal Dysplasias (NFED) Family Conference, FDH Session, July 24th, 2015. Participation was optional and all responses anonymous. Proof of genetic diagnosis was not required. Parent(s)/guardian(s) completed the questionnaire on behalf of children. This study was approved by our Institutional Review Board. All returned surveys were

Corresponding Author: Sherrie J. Divito, MD, PhD, Instructor, Harvard Medical School, Associate Physician, Brigham and Women's Hospital, Department of Dermatology, Harvard Institutes of Medicine, Rm 660, 77 Ave Louis Pasteur, Boston, MA 02115, Phone: 617-525-5550, sdivito@bwh.harvard.edu.

This study was IRB approved.

All authors provide consent for publication.

Conflict of Interest: The authors have no conflicts of interest to declare

included in analysis. Unanswered questions and responses specifying “I don’t know” were treated as missing data, and were excluded from analysis of that question.

Seventeen patients/families participated in the study (Table 1). Median patient age was 9 years (range 1.6 – 57 years); 16 patients were 16 years-old. Eleven participants were female, five were male (1 unanswered). Three study children experienced multiple fractures (Table 1). Four of 17 children underwent bone density testing, though only 2 knew test outcome. An 11 year-old female with history of both arm and pelvic fracture tested positive for osteoporosis. This last observation raises concern that bone strength may be affected in FDH patients, and warrants further investigation. Given the safety profile of calcium and vitamin D, clinicians might consider supplementation in FDH patients.

All participants reported skin and nail involvement (Table 2). Twelve of 16 participants reported scalp/hair involvement. The majority of respondents endorsed skin/scalp symptoms (pruritus, burning, stinging, and tenderness). Five of 15 participants endorsed nail pain.

The majority of respondents reported skin disease progression. Progression included (i) increased surface area involved, (ii) worsened severity of already involved skin, (iii) worsened symptoms, and/or (iv) new papillomas (Table 2). Six of 17 participants endorsed progression of nail disease. Four of 16 participants endorsed worsening scalp symptoms, though none reported increased alopecia with time.

All 17 participants reported experiencing flares of skin disease, 5 of 17 nail disease, and 3 of 17 hair disease (Table 2). Commonly endorsed triggers included physical illness, heat/humidity, cold and/or dry air, emotional stress, and exercise. One respondent reported food allergies and one reported puberty as triggers.

The enclosed data indicate that in FDH patients, skin, scalp/hair and nail disease are prevalent, commonly flare, and for many patients progress over time. This suggests that clinicians might consider counseling patients/families about potential flare triggers and temper patient/family expectations. Importantly, participants overwhelmingly identified skin manifestations as the single most important aspect of disease that they wish could be improved (data not shown).

Study limitations include small sample size, selection bias, and recall bias. Despite these limitations, these data provide guidance regarding expectations for clinicians, patients, and families, while also suggesting future avenues of research.

Acknowledgments

Funding source: National Foundation for Ectodermal Dysplasias

The authors would like to thank the National Foundation for Ectodermal Dysplasias for making this research possible and all the FDH patients and families that participated in this study.

References

1. Goltz RW. Focal dermal hypoplasia syndrome. An update. Archives of dermatology. Aug; 1992 128(8):1108–1111. [PubMed: 1497368]

2. Grzeschik KH, Bornholdt D, Oeffner F, et al. Deficiency of PORCN, a regulator of Wnt signaling, is associated with focal dermal hypoplasia. *Nature genetics* Jul. 2007; 39(7):833–835.
3. Wang X, Reid Sutton V, Omar Peraza-Llanes J, et al. Mutations in X-linked PORCN, a putative regulator of Wnt signaling, cause focal dermal hypoplasia. *Nature genetics* Jul. 2007; 39(7):836–838.
4. Sheu J, Divito SJ, Hoffman EP, Frank NY, Merola JF. Mosaic focal dermal hypoplasia caused by a novel somatic mutation in *PORCN* gene detected in affected skin. *British Journal of Dermatology*. 2015
5. Hall EH, Terezhalmay GT. Focal dermal hypoplasia syndrome. Case report and literature review. *Journal of the American Academy of Dermatology* Sep. 1983; 9(3):443–451.

Table 1

Demographic and bone health data of survey respondents.

Age (years)	Gender	Number/location of fracture(s)	Bone density testing/results	Treatment with calcium + vitamin D
1.6	F			
3	M			
5	F			
5	F		Yes/Unknown	
7	F	1, arm		
7	*	2, arm and leg	Yes/Negative	Yes
9	M			
9	M			
9	F			
10	F			
11	F	2, arm and pelvis	Yes/Positive	Yes [#]
11	F			
14	F			
14	F			
15	F			
16	M	4, 1 arm and 3 leg	Yes/Unknown	
57	M	2, finger and toe		

* Unanswered

[#] Also considering bisphosphonate or hormone injections

Table 2

Skin, hair and nail involvement in FDH patients.

	No. of respondents reporting disease/ Total no. of respondents (%)	No. of respondents reporting disease progression/Total no. of respondents (%)	No. of respondents reporting disease flares/Total no. of respondents (%)
Skin	17/17 (100%)	12/17 (%)	17/17 (100%)
Scalp/Hair	12/16 [#] (75%)	4/16 [#] (25%)	3/17 (18%)
Nail	17/17 (100%)	6/17 (35%)	5/17 (29%)

	No. of respondents reporting symptoms/ Total no. of respondents		No. of respondents endorsing triggers of flares/Total no. of respondents
Skin/Scalp Symptoms		Triggers	
Pruritus	12/17 (71%)	Heat/humidity	15/16 [#] (94%)
Burning	11/15 ^{#*} (73%)	Cold/dry air	15/16 [#] (94%)
Stinging	7/14 ^{***} (50%)	Emotional stress	13/15 ^{#*}
Tenderness/Soreness	10/15 ^{#*} (67%)	Physical illness	16/16 [*]
Nail Pain	5/15 ^{#*} (33%)	Exercise	11/12 ^{*****}

*
one,

**
two, or

four participants responded "I don't know" to this question

one respondent did not answer this question