Original Article

Evaluation of Potential Skin Sensitization of Humans Receiving Bright and Firm Hybrid Emulsion I

Sitthiphon Bunman, MSc[1] ; Narongpon Dumavibhat, MD, PhD[2] ; Pannee Chinjarernpan, PhD[3] ; Sirawit Stitsmith, MD[4]; Sanghyun Kim, MSc[5]

Sitthiphon Bunman, MSc,
(PhD Candidate)

[1] Department of Community and Family Medicine, Faculty of Medicine, Thammasat University, Thailand
[2] Department of Preventive and Social Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand.
[3] Faculty of Medical Technology, Nakhonratchasima College, Nakhonratchasima, Thailand
[4] Faculty of Medicine, Burapha University, Chon Buri, Thailand
[5] Department of Plant Physiology, Umeå Plant Science Centre, Umeå University, Umeå, Sweden

*Address Correspondence to author:
Sitthiphon Bunman, MSc
Department of Community and Family Medicine, Faculty of Medicine, Thammasat University, 99 Moo 18 Paholyothin Road, Klong Luang Pathumthani 12120, Thailand
email: Acetaminophen55@gmail.com

Received: October 16, 2019
Revision received: January 06, 2020
Accepted after revision: January 21, 2020
BKK Med J 2020;16(1): 22-25.
DOI: 10.31524/bkkmedj.2020.11.005
www.bangkokmedjournal.com

Abstract

OBJECTIVES: The aim of this study was to evaluate potential skin sensitization of human receiving Bright and Firm Hybrid Emulsion I.

MATERIAL AND METHODS: 130 subjects were recruited and the human repeated insult patch test (HRIPT) was used to assess the skin sensitization potential of the Bright and Firm Hybrid Emulsion I. The test article container was 0.2 g and the size per patch test was 2x2 cm^2. The placebo patch tests were applied on normal skin at the right scapula area and Bright and Firm Hybrid Emulsion I patch tests were applied on the left scapula area. In the induction phase, subjects applied patch tests on Monday, Wednesday, and Friday for three consecutive weeks. All of the patch tests were removed 24 hours (h) after being applied and the HRIPT score was evaluated. After the induction phase, a single challenge patch was applied to a naïve site of normal skin. The challenge phase is scored 24, 48, and 72 h after application and the experiment was monitored at the 72 h HRIPT score reading.

RESULT: All 130 subjects completed the study. The age of subjects ranged between 19 to 33 years old (mean age 21.45 ± 1.45 years). The HRIPT scoring scale was measured for to the induction and challenge phase, edema, papules, vesicles, and bullae of the subjects who applied Bright and Firm Hybrid Emulsion I. The results were not significantly different when compared to the placebo patch test group.

CONCLUSION: This study shown that Bright and Firm Hybrid Emulsion I is a low skin sensitization potential among subjects.

Keywords: Bright and Firm Hybrid Emulsion I, human repeated insult patch test, potential skin sensitization

In 2011, Bunman et al.,[1] discovered and developed cream extraction from the head of fish cartilage. In 2015, this material has been added to silver sulfadiazine for accelerate and facilitate wound healing and to promote collagen synthesis. In 2016, Bunman et al.,[2] studied liver and kidney toxicity in rats receiving cream extraction from fish cartilage. This result demonstrated that cream extracted from fish cartilage accelerated and facilitated wound healing without causing toxic effects to the liver and kidney in rats in long term use.

In 2018, Bunman[3] formulated a new serum for facial wrinkle relief and to promote collagen synthesis. The study demonstrated that this serum has accelerated collagen synthesis and low potential skin sensitization in rat models. In 2019, Bunman developed and formulated a new cream for facial care, Bright and Firm Hybrid Emulsion I. Bright and Firm Hybrid Emulsion I is composed of many active ingredients to reduce wrinkles, to promote facial whitening and collagen synthesis. However, this product hasn't been investigated for potential skin sensitization in humans.

The aim of this study is to evaluate potential skin sensitization of applied Bright and Firm Hybrid Emulsion I using modified HRIPT.

Materials and Methods

The study had 130 subjects aged between 18-60 years. The subjects were informed of the HRIPT, including possible adverse skin reactions from this experiment. Written informed consent was obtained. Additionally, the subjects must be considered dependable and able to read Thai language, understand, and follow Thai instructions. Prior to test initiation, each subject completed a medical history form. The subjects selected met all of the inclusion and exclusion criteria.[4]

Inclusion criteria

1. Subjects males or females
2. Aged between 18 - 60 years old
3. Individuals of any skin type
4. Individuals free of any systemic, dermatological disorder, or other medical issues
5. Individuals able to read, understand, and provide written informed consent

Exclusion criteria

1. Women planning a pregnancy, self-reported pregnant, or nursing.
2. Subjects with a history of any dermatological disease or condition, including but not limited to active allergies, active eczema, psoriasis, atopic dermatitis, or skin cancer within the past 6 months.
3. Individuals taking medications which might interfere with the test results such as antihistamines, immunosuppressive drugs, or steroidal/non-steroidal anti-inflammatory drugs.
4. Individuals who have applied any type of topical antihistamines, antihistamines, immunosuppressive drugs, or steroidal/non-steroidal anti-inflammatory drugs to the test sites within 2 weeks prior to enrollment.
5. Individuals who are currently receiving allergy injections, have received antihistamines, immunosuppressive drugs, or steroidal/non-steroidal anti-inflammatory drugs injections within a week prior to enrollment.
6. Individuals with any other skin condition that would interfere with the conduct of the study.
7. Individuals with a history of immune deficiency or auto-immune disease.

Experimental design of HRIPT studies[4-7]

Induction phase

The HRIPT was used to assess the skin sensitization potential of the Bright and Firm hybrid emulsion I, which was modified from Chuenwattana et al., Politano and Api.[4, 5] The amount of the test article applied per patch test was 0.2 g of test article and the patch size was 2x2 cm^2 per patch test (Figure 1). Subjects, both male and female, applied patch tests. The placebo patch tests (containing 0.9% normal saline) were applied on normal skin at right scapula and Bright and Firm Hybrid Emulsion I patch tests were applied on normal skin at left scapula. Subjects applied patch tests on Monday, Wednesday, and Friday for three consecutive weeks. All of the patch tests were removed 24 h after being applied and HRIPT scoring (Table 1) was evaluated. This procedure was repeated until 9 induction applications of the test article were made.

Challenge phase

The challenge phase is 10 - 14 days after the induction phase. A single challenge patch is applied to a naïve site of normal skin on right scapula (placebo patch tests) and a Bright and Firm Hybrid Emulsion I patch is applied on left scapula. The subjects are instructed to return to the testing facility 24 h later for removal of the patch tests by the researcher. The challenge site is scored 24, 48, and 72 h after being applied and the experiment monitor was present at the 72 h HRIPT score reading.

The erythema scale is used to grade the degree of erythema (redness). A score on this scale was assigned following every application of a test material (Figure 2).[5-7]

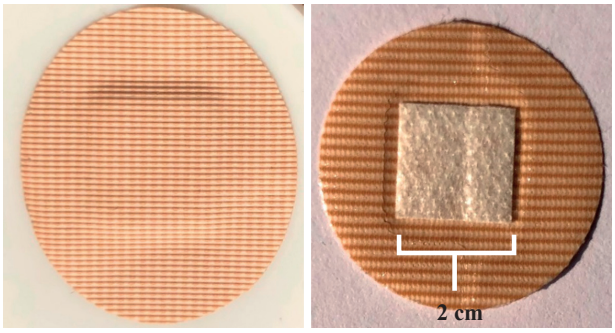

Figure 1: Patch test size was 2x2 cm^2

Table 1: HRIPT scoring scale:

Grade	Skin reaction
0	Negative reaction (no visible erythema)
1	Mild erythema (slight erythema, either spotty or diffuse)
2	Moderate erythema (definite redness)
3	Severe erythema (very intense redness)

The definitions of evaluated skin response

Edema: definite swelling
Papules: many small, red, solid elevations; surface of reaction has granular feeling
Vesicles: small circumscribed elevations having translucent surfaces so that fluid is visible (blister-like); vesicles are no larger than 0.5 cm in diameter
Bullae : vesicles with a diameter > 0.5 cm; vesicles may coalesce to form one or a few large blisters that fill the patch site

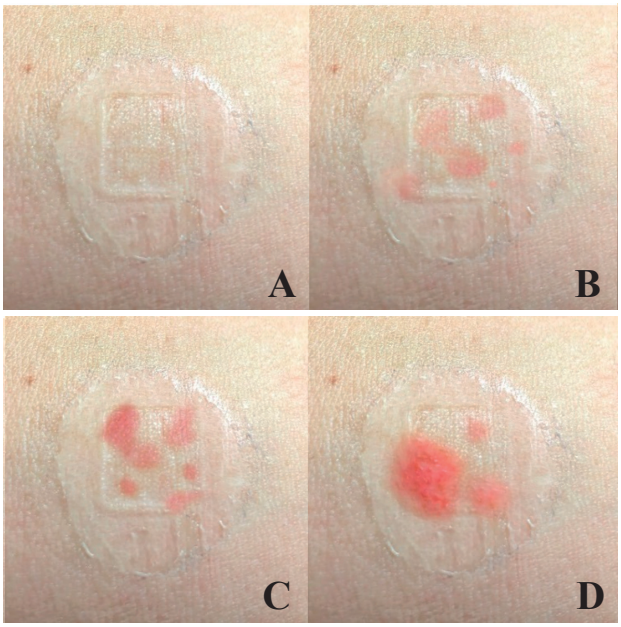

Figure 2 : Erythema grading of HRIPT scoring scale; Grade 0 is negative reaction (A); Grade 1 is mild erythema (B); Grade 2 is moderate erythema (C); Grade 3 is severe erythema (D).

Statistical analysis

Results are expressed as means ± SD. The demographic data of subjects were analyzed using descriptive statistics. HRIPT scoring scale data were analyzed using independent t test, and using SPSS for Windows, version 22. Values of $p < 0.05$ were considered to be significant.

Results

All 130 subjects completed the study, and were aged between 19 -33 years old (mean age 21.45±1.45 years) with the majority, 118 were females (90.8%) and 12 were males (9.2%). The demographic data of subjects are in Table 2. The subjects had atopic history 26 (20%), atopic dermatitis 26 (20%), allergic rhinitis 26 (20%), allergic conjunctivitis 6 (4.6%), family history of allergy 18 (13.8%), previous skin care products allergy 45 (36.6%), and previous sunscreen allergy 20 (15.4%), respectively (Table 2).

The HRIPT scoring scale of induction phase and challenge phase, edema, papules, vesicles, and bullae of subjects who applied Bright and Firm Hybrid Emulsion I were not significantly different when compared to the placebo patch test group (Table 3 and Figure 3).

Discussion

The test results of the Bright and Firm Hybrid Emulsion I HRIPT procedure were interpreted with a HRIPT scoring scale among subjects aged between 18 - 60 years old, and a number of erythematous reactions were reported that included edema, papules, vesicles and bullae.

Table 2 : Demographic data of subjects. (n = 130)

Demographic data	n (%)
Gender	
Male	12 (9.2)
Female	118 (90.8)
Age (years), mean ± SD	21.45 ± 1.45
Range	19 - 33
Atopic history	
Yes	26 (20.0)
No	104 (80.0)
Atopic dermatitis	
Yes	26 (20.0)
No	104 (80.0)
Allergic rhinitis	
Yes	26 (20.0)
No	104 (80.0)
Allergic conjunctivitis	
Yes	6 (4.6)
No	124 (95.4)
Family history of allergy	
Yes	18 (13.8)
No	112 (86.2)
Previous skin care products allergy	
Yes	45 (36.6)
No	85 (64.4)
Previous sunscreen allergy	
Yes	20 (15.4)
No	110 (84.6)

Table 3 : Demographic data of subjects. (n = 130)

Parameters	Erythema scale (Grade)	
	Placebo (n = 130)	Bright and Firm Hybrid Emulsion I (n = 130)
Induction phase		
Edema	0	0
Papules	0	0
Vesicles	0	0
Bullae	0	0
Challenge phase		
Edema	0	0
Papules	0	0
Vesicles	0	0
Bullae	0	0

In the induction phase, all volunteers in this study did not have any reactions after an emulsion was applied, then the HRIPT procedure was repeated again in the challenge phase to see if skin was immune to sensitization. If any reaction occurs in the challenge phase this method is performed to confirm skin sensitization in the re-challenge phase.

ISSN 2287-0237 (online)/ 2228-9674 (print)

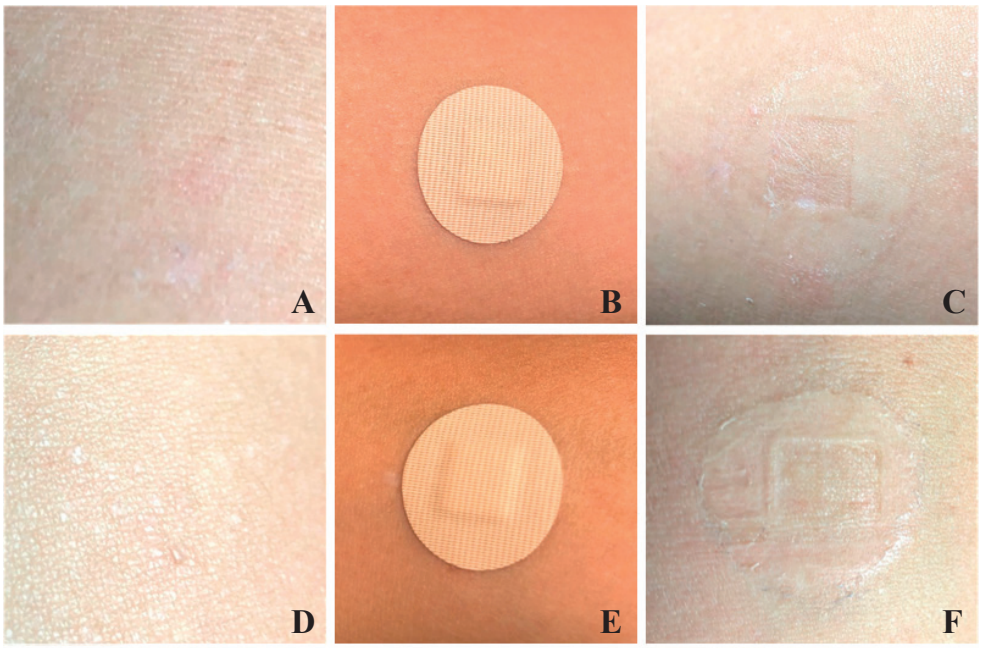

Figure 3: A and D are normal skin. B applied a Bright and Firm Hybrid Emulsion I patch test and E applied a placebo patch test. C and F were challenge phase.

In 2008, the HRIPT protocol of The Research Institute for Fragrance Materials (RIFM)[5] used the patch test containing a quantity of chemical concentration per skin area to evaluate skin irritation. In this study subjects numberejjjd 130. This is higher than a group of specimens in a statistical calculation of a patch test, adapted for the detection of reaction to chemical agents, observed in 100 test subjects.[8] If there is no reaction detected in a test group, the chances of a positive reaction occurring in the marketplace will not exceed 2.9 % on a confidence level of 95%.

In this study, no reaction was recorded by any of the 130 subjects once the induction phase was completed. The HRIPT scoring scale is therefore "0". The HRIPT scoring scale was re-evaluated in the challenge phase in order to confirm skin sensitization and all subjects reported negative results. This HRIPT study demonstrated that Bright and Firm Hybrid Emulsion I has low potential skin sensitization. It is an appropriate hypoallergenic product to be used for facial or body skin care.

Conclusion

The result from this study demonstrated that Bright and Firm Hybrid Emulsion I not only displays low potential skin sensitization but also benefits from pleasant characteristics for cosmetic use. Further investigation of the potential skin sensitization of Bright and Firm Hybrid Emulsion I among a large population study group is required.

Conflicts of interest

The authors declare that they have no conflicts of interest.

References

1. Bunman S, Aramwit P, Larbcharoensub N, et al. Application of proteoglycans from fish cartilage for the acceleration of burn wound healing. *TJPS* 2015;39(3) 64-9.
2. Bunman S, Dumavibhat N, Larbcharoensub N. Evaluation of Liver and Kidney Toxicity in Rats Receiving Proteoglycans from Fish Cartilage for the Acceleration of Burn Wound Healing. *BKK Med J* 2016;11(1)11-6.
3. Chuenwattana W, Chatthanawaree W, Bunman S, et al. The Evaluation of Potential Skin Sensitization and Collagen Synthesis of Rats Receiving Proteoglycan Serum. *BKK Med J* 2018;14(1)1-4.
4. Chuenwattana W, Bunman S, Kim J. Evaluation of Potential Skin Sensitization of Humans Receiving Proteoglycan Facial Mask. *BKK Med J* 2019;15(1)7-10.
5. Politano VT, Api AM. The Research Institute for Fragrance Materials' human repeated insult patch test protocol. *Regul Toxicol Pharmacol* 2008;52(1):35-8.
6. Boonchai W, Sathaworawong A, Wongpraparut C, et al. The sensitization potential of sunscreen after ablative fractional skin resurfacing using modified human repeated insult patch test. *J Dermatolog Treat* 2015;26(5):485-8.
7. An SM, Ham H, Choi EJ, et al. Primary irritation index and safety zone of cosmetics: retrospective analysis of skin patch tests in 7440 Korean women during 12 years. Int J Cosmet Sci 2014;36(1):62-7.
8. Henderson CR, Riley EC. Certain statistical considerations in patch testing. *J Invest Dermatol.* 1945;6(3):227-30.