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Prevalence of Allergies in China and Impact on Skin - Epidemiological Study on a Representative Sample of Chinese Adults

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Abstract

Background: The skin is one of the largest targets for allergic and immunologic responses.

Methods: An online survey was conducted in China on 3,010 adults as a representative sample of the general Chinese population.

Results: 41.3% of Chinese adults (mean age 34.9 +/- 10.7 years old) reported having allergies. Reported allergies included skin allergies (83.3%), respiratory allergies (62.9%) and food allergies (51.7%), and 74.2% reported a doctor had diagnosed their allergies. 89.4% of those who reported allergies also reported experiencing associated skin reactions, they were 2 to 4 times more likely to report a cutaneous disease and were 2 times to report a sensitive skin compared to those who did not report allergies. In addition, those that reported allergies were also 2 to 3 times more likely to report experiencing skin reactions when using skincare products.

Conclusions: It is estimated that over 470 million Chinese adults report having allergies. These results will help raise the awareness among both health care professionals and general population about the burden of allergies and the need to develop solutions to mitigate their impact on health.

Keywords: Allergies; Food Allergy; Skin Allergy; Respiratory Allergy; Prevalence; Skin Side Effects

Abbreviations: AD: Atopic Dermatitis; RR: Relative Risk; TPE: Therapeutic Patient Education.

Background

In the Western world, prevalence of allergies, including hay fever, asthma, food allergy and dermatitis especially atopic dermatitis (AD), has been on the rise, a phenomenon referred to as the "allergy epidemic". The prevalence of childhood AD has been documented in a number of publications, which revealed that the prevalence of AD has increased over 3-fold since the 1960s, which ranges from 15% to 30%. Similarly, in China, the prevalence of AD in children aged 1 to 7 years has increased from 3.07% in 2002 to 12.94% in 2014.

Furthermore, in a survey that included 47,216 people, the prevalence of allergic rhinitis, asthma and atopic dermatitis was 17.6%, 5.8% and 14% respectively. This survey revealed a significant increase of allergic diseases from 2005 to 2011 [1-7]. Here, we describe the results of an online survey assessing allergy prevalence in China, outline the populations who report allergies, and characterize the skin conditions associated with allergy.

Methods

Study Population

A polling institute (HC Conseil Paris, France) conducted the current survey between December 2018 and January 2019. A sample of the general Chinese adult population, over 18 years of age, was recruited. Proportional quota sampling was applied to render the study population representative of the Chinese general adult population following data available and published. These quotas were based on the following aspects: sex, age, socio-professional status and regional distribution. Data were collected via Internet by random selection of 3,010 Chinese people among the large number of internet users over 18 years of age who agreed to participate. Each participant was contacted by e-mail, and if the contact failed or questionnaire was not entirely completed, another participant with the same characteristics was randomly selected. Missing data was not allowed and respondents were required to provide an answer to all questions.

Survey

Because this research employed completely anonymized data without involving direct participant contact, an institutional review board approval was not necessary prior to study initiation. It is a declarative survey without any doctor confirmation of the answers. Respondents were asked a range of socio-demographic questions including gender, age, occupation/social class, area of residence; tobacco use; phototype; presence of allergies; type of allergies; allergens; medical diagnosis confirmation; therapeutic treatment; symptoms, skin pathologies, skin effects and skin symptoms. Questions regarding the impact of environmental factors like exposure to environmental pollution and sun were also asked.

Statistical Analysis

In this descriptive study, participants who reported allergies were compared to participants who did not report any allergies. Quantitative variables were expressed as mean and standard deviation. Qualitative variables were expressed as frequencies and percentages. Comparisons between groups were performed using the Student test in the case of quantitative variables; for categorical variables, intergroup comparisons were done with the χ^2 test. Relative risk (RR) was calculated for comparison of the population who reported allergies to the population who did not reported allergies. The level of significance was set at 5%. Statistical analyses were performed using R software version 3.6.1.

Results

Global Population

Out of the 3,010 respondents (18 to 74 years old, 52.5% males and 47.5% females as the general adult Chinese population), 41.3% of subjects (mean age 34.9 +/- 10.7 years old) reported having allergies (of which 54.5% were men and 45.5% were women). As the general Chinese population, 6% of the total population lived in rural areas (< 150,000 inhabitants), 21% in suburban or medium size cities (between 150,000 and 3 million inhabitants), 73% in large cities (>3 million inhabitants). 34.5% were smokers. The phototype repartition of the total population was 6.2%, 17.5%, 32.9%, 29.7%, 6.7% and 7% for respectively phototype I to VI. Reported allergies included skin allergies (83.3%), respiratory allergies (62.9%) and food allergies (51.7%). 74.2% reported their allergies had been diagnosed by at least one doctor, a dermatologist, a pulmonary specialist or a pediatrician most frequently (Table 1).

	n	%
Participants reporting an allergy	**1242**	**41,26%**
Participants able to name the allergy	730	58,78%
Percentage of participants diagnosed by a doctor	**922**	**74,24%**
Health professional who diagnosed the participant's allergy		
dermatologist	615	66,70%
general practitioner	151	16,38%
allergy specialist	100	10,85%

Otolaryngologist doctor	38	4,12%
homeopathic doctor	9	0,98%
other specialized physician	5	0,54%
pulmonary specialist	2	0,22%
pediatrician	2	0,22%
acupuncturist	0	0,00%

Table 1: Doctors who diagnosed allergies.

However, many reported not using any treatment (corticosteroids, antihistamine or other) - respectively 28.5%, 30.7% and 26.8% of those with skin, respiratory and food allergies. 58.8% were able to identify the allergen(s) responsible for their allergies (mainly pollens, mites and food), as well as the main symptoms associated with their allergies were allergic rhinitis or eczema (Table 2).

Symptoms associated with allergy reported by participants	**n**	**%**
allergic rhinitis (hay fever)	691	55,64%
eczema/atopic dermatitis	604	48,63%
edema	156	12,56%
bronchitis with wheezing	120	9,66%
asthma	104	8,37%
conjunctivitis	102	8,21%
other	38	3,06%
Allergen reported by participants	**n**	**%**
pollens	659	53,06%
dust mites	456	36,71%
food allergens	407	32,77%
mold	244	19,65%
dogs, cats, ferrets, other animals	195	15,70%
other	96	7,73%
latex	89	7,17%
cockroaches	85	6,84%
Hymenoptera (bees, wasps, hornets etc.)	66	5,31%

Table 2: Symptoms and allergens related by the allergic population.

89.4% of those who reported allergies also reported experiencing associated skin reactions. In 68.3% a doctor diagnosed this skin reaction, and 53.9% of those experiencing skin reactions reported resorting to topical and/or oral treatments (Table 3).

	n	**%**
Percentage of participants reporting skin reaction	1111	89,45%
Percentage managed by a doctor	759	68,32%
Health professional who managed the skin reaction?		

dermatologist	615	66,70%
general practitioner	151	16,38%
allergy specialist	100	10,85%
Participants reporting prescribed treatment for skin reaction	599	78,92%
What kind of treatment was prescribed for your skin reaction?		
topical	471	78,63%
oral	364	60,77%
Skincare product	156	26,04%

Table 3: Skin reactions associated with allergies.

Allergic Population Versus non-Allergic Population

The population who reported allergies was slightly younger (mean age 34.9 +/- 10.7 versus 36.9 +/- 12.1 years old, p<0.0001) in comparison to the population who did not report allergies. They included slightly less women (45.5% vs 48.9%) (NS), were more likely to live in big cities (79.2% vs 68%, p<0.0001), to smoke (34.5% vs 28.5%, p<0.0001) and to have a light (I, II, II) phototype (60.1% vs 54.2%, p<0.002). Those who reported allergies were 2 to 4 times more likely to also report a skin disease (sun allergy (RR=3.58 [3.06 – 4.17], p<0.001), contact eczema (RR=3.16 [2.70– 3.69] , p<0.001), rosacea (RR=3.46 [2.79 – 4.34] , p<0.001), psoriasis (RR=3.61[2.71– 4.80] , p<0.001), eczema including atopic dermatitis (RR=2.58 [2.27 – 2.92] , p<0.001) or acne (RR=1.81 [1.57 - 2.07] , p<0.001)) and were 2 times more likely to report sensitive skin (RR=2.38 [2.21 – 2.57] , p<0.001) compared to those who did not report allergies (Figure 1).

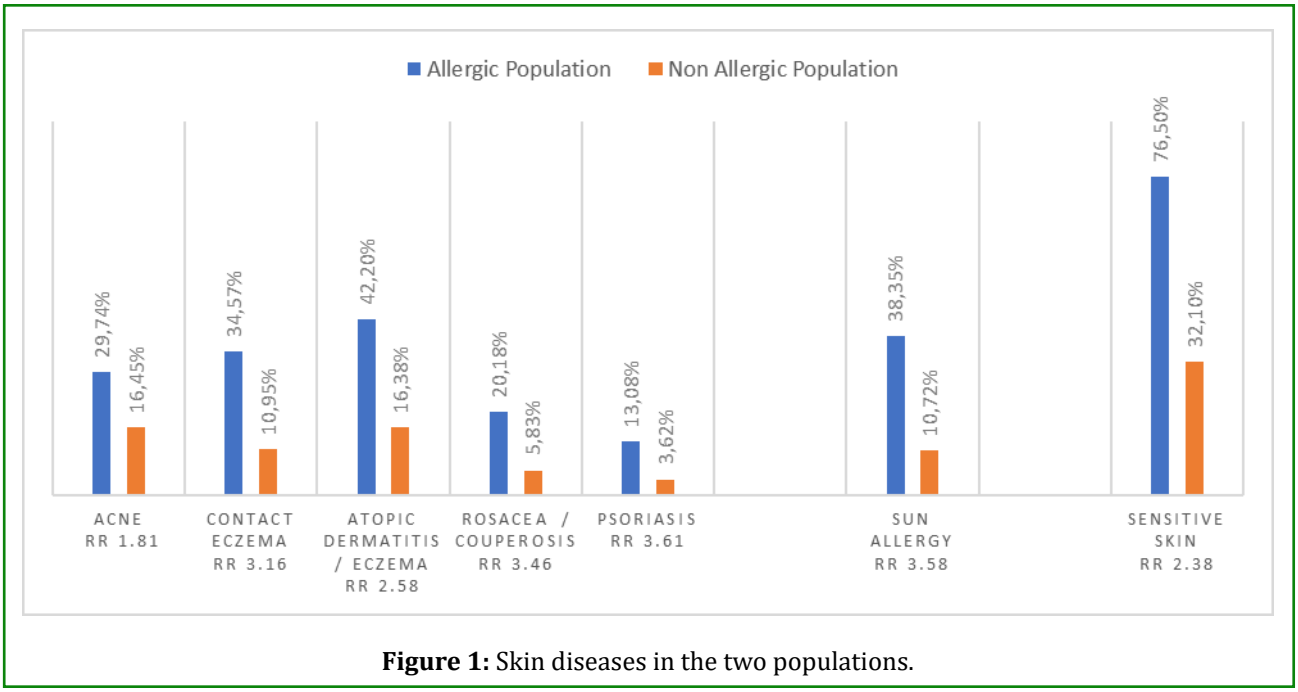

Figure 1: Skin diseases in the two populations.

They were significantly more likely to report sensitive skin (76.5 vs 32.1%), particularly very sensitive skin (13.7 vs 4.2%) (p<0.001) but also sensitive eyes (41.9 vs 12.5%, p<0.001) and having parents with sensitive skin (46.8 vs 14.9%, p<0.001). Interestingly, 77.7% of those who reported allergies also reported having AD during childhood versus 33.6% for those who did not report allergies (p<0.001). Those who reported allergies were more likely to experience skin discomfort and reported a higher incidence of severe skin discomfort (Figure 2).

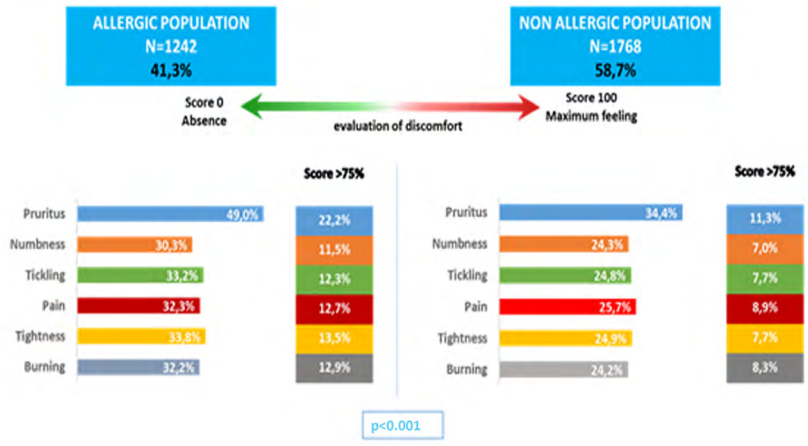

Figure 2: Skin discomforts in the two populations.

They were also more likely to report experiencing skin reactions (pruritus: RR=2.37; burning: RR=2.07 or tickling: RR=3.17 p<0.001) when using skincare products (Figure 3).

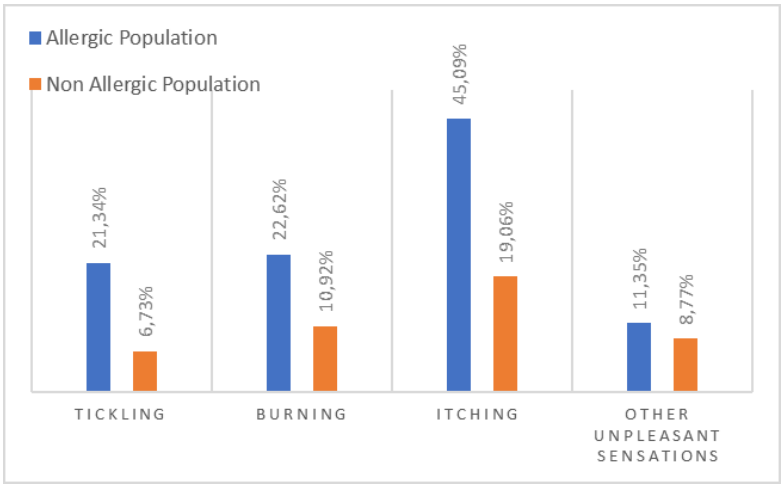

Figure 3: Skin discomforts associated with skincare products in the two populations.

Environmental Impact

The population who reported allergies was significantly more impacted by air, water, ground, noise, light and radiation pollution (p<0.0002) than the population who did not report allergies (Table 4).

	Impacted			Worried	
Air	Allergic n= 1242	Non Allergic n= 1768	p-value	Allergic n= 1242	Non Allergic n= 1768
	90,34%	81,17%	<0.0001	59,42%	51,30%
Water	55,31%	47,23%	<0.0001	8,21%	14,59%
Soil	28,26%	17,31%	<0.0001	3,30%	3,17%
Noise	63,85%	52,26%	<0.0001	10,79%	12,84%
Light	40,90%	22,51%	<0.0001	3,30%	1,47%
Radiation	59,10%	40,55%	<0.0001	14,65%	12,10%

Table 4: Impact of the pollution in the two populations.

They more frequently claimed that pollution affected their way of life (92.3 vs 70.3%, p<0.001) and had a health and well-being impact (94 vs 74%, p<0.0001). They also more commonly noted an impact of pollution on their skin (62 vs 42%, p<0.001, quite to very important for 64.5 vs 34.7%, p<0.001) and use of skincare products to protect their skin against pollution (20.5 vs 16.7%, p<0.009).

In the population who reported allergies, significantly more had moderate and intense daylight solar exposure than the population who did not report allergies (75 vs 59.7%, p<0.0000). Nevertheless, only 8.7% reported not using any photoprotection in comparison to 23.7% in the population who did not report allergies (p<0.0001) and they were more likely to apply sunscreen during outdoor leisure activity (35.3 vs 25.4%, NS), or when working outdoors (41.4 vs 30.2%, p=0.029) and during intense sun exposure (52.8 vs 40.4%, p<0.0001).

Discussion

In this survey of a representative sample of the general Chinese population, 41.3% of survey respondents reported having allergies. Self-report may be one limitation of this study, even if 74.2% of the respondents who reported allergies said that a doctor had officially diagnosed these allergies. A non-immunologically food adverse response may easily be misconstrued to be an allergic reaction and self-reported as such. Another limitation of this study is that only adults 18 years and older were sampled when allergy rates are increasing most rapidly among children. Nevertheless, some results suggest a high prevalence of allergic diseases in Chinese teens and young adults. Wang et al performed a survey in Hebei and Tianjin that included 5010 subjects. They found that the prevalence of allergic rhinitis, asthma and atopic dermatitis was 16.4%, 10.5% and 16.7% respectively. Another study in university students demonstrated that 22% students had allergic diseases including 4.3% of allergic rhinitis, 3.4% of atopic dermatitis and 7.6% food allergy. There are many theories attempting to explain the ongoing escalation in allergy prevalence. The role of the skin barrier in allergic sensitization has been well described. Specifically, dysfunction of the skin barrier can increase the likelihood of allergens encountering the immune system, which can trigger sensitization. However, the impact of allergies on other skin conditions has been less thoroughly characterized. Nonetheless, the survey results presented here show a clear association between reporting any type of allergy and reporting skin disease or skin sensitivity. While some of these links are relatively well established, such as that between food allergy and atopic dermatitis, others are less clear [8-13].

Concerning the high percentage of respondents who reported allergies also reported having AD during childhood it is important to note that AD as allergy carries a high economic burden and increasing use of healthcare resources [9]. Furthermore, lack of understanding of the disease process and management plan, corticosteroids phobia, lack of confidence in therapies and sense of helplessness lead to poor clinical outcomes and low compliance to AD treatment that could affect the prevalence of future allergies. Therefore, educational programs for AD patients play an increasingly important role in the long-term management of AD and allergies. Although there are limited experiences of "Therapeutic Patient Education" or TPE about AD, patient education has been shown to contribute to better disease management, significant improvement of life quality and increased adherence to treatment [14-18]. A first multicenter, randomized, and controlled trial about TPE was conducted in moderate to severe AD children and their parents in China. This study demonstrated a significantly more efficient long-term control of AD in children and adolescents but also a statistically improved life quality of patients and parents, and a better emollients knowledge than with conventional treatment [19-32].

Conclusions

Understanding allergy is critical to providing care to the vast proportion of Chinese who suffer from its symptoms. For the millions of people coping with allergies, allergies can create significant lifestyle burden. Anxiety, impact on relationships, embarrassment, and frequent interruptions to normal tasks brought on by respiratory, food, and skin allergy symptoms all contribute to poorer quality of life in those with allergies [33-35]. Much work still needs to be done in developing ways to manage allergies. Strategies such as avoidance can be an option for those who are able to identify the causative allergens. However, without well-developed therapeutic solutions to existing allergies, the prevalence of allergies is bound to continue to rise, even as incidence stabilizes [2].

Declarations

Ethics Approval and Consent to Participate

This research highlights the prevalence of declared allergies in the Chinese population and could help in a public health perspective for a better management of people suffering from allergy. Because this research is based on a survey using completely anonymized data and without any participant contact, an institutional review board approval was not required. It was not possible to trace the identification of participants. Nevertheless, the GDPR rules were followed during the questionnaire administration.

Consent for Publication

All the authors give their consent for publication.

Availability of Data and Material Competing Interests

All data have been shared and archived following good practices.

Funding

The project was set up by the European Market Maintenance Assessment Company, which obtained a grant from La Roche-Posay Dermatological Laboratories, France. La Roche-Posay Dermatological Laboratories did not interfere in the choice of questions nor in the analysis of the results.

Author Contributions

CT has participated in the conception and design of the study and acquisition of data. SS, CT, TLS, PL, JZ, LM have participated to the interpretation of data and in the critical review of the manuscript. All authors have read, and approved the final submitted version.

Competing Interests

S. Seité is employee of La Roche-Posay, France. P. Lio has served as a consultant and speaker for L'Oreal/La Roche-Posay. He has also been a consultant/advisor for Micreos, Pierre-Fabre, Johnson & Johnson, Syncere Skin Systems, Altus Labs, AOBiome, Galderma, IntraDerm, Theraplex, Unilever, and is a board member of the National Eczema Association. C. Taieb, T. Lazic Strugar, J. Zhang and L. Ma have served as a consultant for L'Oreal/La Roche-Posay.

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References

1. Okada H, Kuhn C, Feillet H, Bach JF (2010) The 'hygiene hypothesis' for autoimmuneand allergic diseases: an update. Clin Exp Immunol 160(1): 1-9.

2. Tang ML, Mullins RJ (2017) Food allergy: is prevalence increasing? Intern Med J 47(3): 256-261.

3. Joseph A Odhiambo, Hywel C Williams, Tadd O Clayton, Colin F Robertson, M Innes Asher, et al. (2009) Global variations in prevalence of eczema symptoms in children from ISAAC Phase Three. AllergyClinImmunol 124(6): 1251-1258.

4. Heng G, Liping Liu, Yongsheng L (2004) Survey on the Prevalence of Childhood Atopic Dermatitis in Ten Cities of China. Chinese J Dermatol 37(1): 29-31.

5. Feng Xu, Shuxian Yan, Fei Li, Minqiang Cai, Weihan Chai, et al. (2012) Prevalence of childhood atopic dermatitis: an urban and rural community-based study in Shanghai. China PLoS One 7(5): e36174.

6. Yifeng Guo, Ping Li, Jianping Tang, Xiuping Han, Xiaoyan Zou, et al. (2016) Prevalence of atopic dermatitis in Chinese children aged 1-7 ys. Sci Rep 6: 29751.

7. X D Wang, M Zheng, H F Lou, C S Wang, Y Zhang, et al. (2016) An increased prevalence of self-reported allergic rhinitis in major Chinese cities from 2005 to 2011. Allergy 71(8): 1170-1180.

8. Sicherer SH (2011) Epidemiology of Food Allergy. J Allergy Clin Immunol 127(3): 594-602.

9. Grief SN (2016) Food Allergies. Prim Care 43(3): 375-391.

10. Wang ZH, Lin WS, Li SY, (2010) A survey on the prevalence of allergic rhinitis, asthma and atopic dermatitis. J Clin Med Prac 14(24): 106-108.

11. Ye Z, Qian Y, Jiang SZ, (2010) Allergic diseases in university students: a survey in Wenzhou Medical College in 2009. Disease Surveillance 25(11): 904-906.

12. Strugar TL, Kuo A, Seite S, Lin M, Lio P (2019) Connecting the Dots: From Skin Barrier Dysfunction to Allergic Sensitization, and the Role of Moisturizers in Repairing the Skin Barrier. J Drugs Dermatol 18(6): 581.

13. Bergmann MM, Caubet JC, Boguniewicz M, Eigenmann PA (2013) Evaluation of food allergy in patients with atopic dermatitis. J Allergy Clin Immunol Pract 1(1): 22-28.

14. Molinari G, Colombo G, Celenza C (2014) Respiratory allergies: a general overview of remedies, delivery systems, and the need to progress. ISRN Allergy 2014: 326980.

15. Kandrack MA, Grant KR, Segall A (1991) Gender differences in health related behaviour: some Unanswered Questions. Soc Sci Med 32(5): 579-590.

16. Dunlop JH, Keet CA (2018) Epidemiology of Food Allergy. Immunol Allergy Clin North Am 38(1):13-25.

17. Ring J, Kramer U, Schafer T, Behrendt H (2001) Why are allergies increasing? Curr Opin Immunol. 13(6): 701-708.

18. Platts-Mills TA (2015) The allergy epidemics: 1870-2010. J Allergy Clin Immunol 136(1): 3-13.

19. Kemp AS (2003) Cost of illness of atopic dermatitis in children: a societal perspective. Pharmaco economics 21(2): 105-113.

20. Holm EA, Wulf HC, Stegmann H, GBE Jemec (2006) Life quality assessment among patients with atopic eczema. Br JDermatol 154(4): 719-725.

21. Williams RB (2002) Resolved: Psychosocial Interventions Can Improve Clinical Outcomes in Organic Disease (Pro). Psychosom Med 64(4): 552-557.

22. Scott R Weingarten, James M Henning, Enkhe Badamgarav, Kevin Knight, Vic Hasselblad, et al. (2002) Interventions used in disease management programs for patients with chronic illness which ones work? Meta-analysis of Published Reports. BMJ 325(7370): 925.

23. Assal J, Decchache A, D'Ivernosi T (1998) Therapeutic Patient Education. Continuing education programs for health providers in the field of prevention of chronic disease. Report of a WHO Working Group, EURO; HQ, WHO pp: 76.

24. Assal JP, Golay A (2001) Patient education in Switzerland: from diabetes to chronic diseases. Patient Edu Couns 44(1): 65-69.

25. Lagger G, Pataky Z, Golay A (2010) Efficacy of therapeutic patient education in chronic diseases and obesity. Patient Edu Couns 79(3): 283-286.

26. Maldonato A, Piana N, Bloise D, Alessandra Baldelli (2010) Optimizing patient education for people with obesity: possible use of the autobiographical Approach. Patient Edu Couns 79(3): 287-290.

27. K Wenninger, R Kehrt, U von Rüden, C Lehmann, C Binder, et al. (2000) Structured parent education in the management of childhood atopic dermatitis: the Berlin model. Patient education and counseling 40(3): 253-261.

28. Marianne Grillo, Lee Gassner, Gillian Marshman, Sandra Dunn, Pamela Hudson et al. (2006) Pediatric Atopic Eczema: The Impact of an Educational Intervention. Pediatric dermatology 23(5): 428-436.

29. Doris Staab, Thomas L Diepgen, Manigé Fartasch, Jörg Kupfer, Thomas Lob-Corzilius, et al. (2006) Age related, structured educational programmes for the management of atopic dermatitis in children and adolescents: multicentre, randomised controlled trial. BMJ 332: 933-938.

30. Joerg Kupfer, Uwe Gieler, Thomas L Diepgen, Manige Fartasch, Thomas Lob-Corzilius, et al. (2010) Structured education program improves the coping with atopic dermatitis in children and their parents-a multicenter, randomized controlled trial. Journal of psychosomatic research 68(4): 353-358.

31. Armstrong AW, Kim RH, Idriss NZ, Larissa N Larsen, Peter A Lio (2011) Online video improves clinical outcomes in adults with atopic dermatitis: a randomized controlled trial. Journal of the American Academy of Dermatology 64(3): 502-507.

32. Liang Y, Tian J, Shen CP, Xu F, Wang H, et al. (2018) Therapeutic patient education in children with moderate to severe atopic dermatitis: A multicenter randomized controlled trial in China. Pediatr Dermatol 35(1): 70-75.

33. Schmier JK, Chan KS, Leidy NK (1998) The impact of asthma on health-related quality of life. J Asthma 35(7): 585-597.

34. Bacal LR (2013) The impact of food allergies on quality of life. Pediatr Ann 42(7): 141-145.

35. Kalboussi H, Kacem I, Aroui H, El Maale O, Maoua M, et al. (2019) Impact of Allergic Contact Dermatitis on the Quality of Life and Work Productivity. Dermatol Res Pract 19: 3797536.