

## CASE REPORT

# EXACERBATED ECZEMA: ROLE OF BUILT ENVIRONMENT IN INCREASING DISEASE SEVERITY AMONG PAKISTANI PATIENTS

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### ABSTRACT

Atopic Eczema is a non-contagious skin disease. This study was undertaken to determine the role of home environment allergens in aggravation of atopic eczema by using EASI (Eczema Area And Severity Index) and POEM (Patient Oriented Eczema Measure). Furthermore statistical analysis was conducted to ascertain contribution of indoor environment allergen in exacerbating disease severity among male and female patients in Pakistan. The results revealed that home environment allergens have the potential to increase severity of atopic eczema experienced by the patients. Paints, air quality and fabric coverings were the most eczema deteriorating elements found inside Pakistani homes.

**KEYWORDS:** Atopic Eczema, Atopic Dermatitis, Allergens, Environment.

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### INTRODUCTION

Human skin is a barrier which protects the internal vital organs from external harm. This protective coating stretches all over and around human body, providing the underlying organs safety from all sorts of jeopardy. Atopic Dermatitis (AD) is a skin disease also known as Atopic Eczema (AE).<sup>1</sup> According to a review study on allergic diseases conducted by collecting only published data of the Gulf states and of a few neighboring states. It was found that not only are allergic diseases very common rather a multi-factorial study should be undertaken to investigate the factors which cause and trigger different allergies in people around these countries for this study will benefit patients as they would be able to take preventative measures and practice control and screening strategies which will save billions of dollars. While there can be many factors which may cause a sudden increase in severity of the disease. There are a number of factors present inside homes which have the potential to exacerbate Eczema.<sup>2</sup> It was revealed by a study that newly painted rooms caused acute-dermatitis and respiratory problems among patients primarily due to isothiazolinones found in paints.

Contrary to the above studies,<sup>3</sup> in a study conducted on asthma and eczema patient it was found that no changes were observed in either asthma or eczema severity from which it was concluded that water based paints with proper ventilation pose no threat to people with such allergies.<sup>4</sup> studies revealed that contact with synthetic fabrics and coverings play a pivotal role in exacerbating eczema.<sup>5</sup> Studies were conducted for seven years in Swiss high mountain area of Davos and it was concluded that AE patients need a certain range of thermo-hygric environment for their skin to feel comfortable. Air temperature had a direct inverse association with AE.<sup>6</sup> aeroallergens and climate change variability has direct association with exacerbation of asthma but further research is required to establish its effects on eczema and allergic rhinitis<sup>7</sup> reported that palm plants have a potential to be an allergen if kept indoors for patients of asthma and allergic rhinitis in Marrakesh people.<sup>8</sup> In allergic rhinitis and atopic eczema indoor plants should be considered as a potential allergen.<sup>9</sup> One hundred and twenty seven Danish patients were tested and the results indicated that along with common ivy, falcarinol is also a plant allergen in case of dermatitis.<sup>10</sup> A double-blind experiment was conducted on thirty-one children age range (3

to 8) in Korea with a regular and an environmentally friendly wallpaper the results revealed that NVOC's (Natural Volatile Organic Compounds) from environmental friendly wallpaping, had a beneficial effect on health of atopic dermatitis patients.<sup>(11)</sup> Cross-sectional study of 5951 Russians depicted that asthma and atopic allergies are caused by particle board, linoleum flooring, potential chemicals being emitted by wallpapers.<sup>(12)</sup> Indoor floor coverings and wall coverings pose a health hazard for people suffering from eczema. Wall to wall indoor carpeting and plastic wall covering were found to be the risk factors. This study tests the following hunches/hypotheses relating to interior environment of homes in Pakistan and their role in exacerbation of Atopic Eczema:

H1: Interior design elements present inside Pakistani homes have the potential to cause relapsing eczema in male and female patients.

H2: Home environment interior design elements result in flared eczema among patients of different age groups.

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The sampling frame comprised of all eczema patients in Punjab. Atopic eczema patients were sampling units of this research. Feedback was assembled from patients both male and female. The sample size for this research was calculated with G-power factor formula 3.0.10. Only those people were made part of this research who could fill in the questionnaires themselves, no children were included in the study. People falling in all the age groups and all income brackets were targeted in this research. Furthermore, only those people were included in this research who were examined by a doctor in OPDs and were declared as chronic atopic eczema patients. Patients suffering from eczema other than atopic such as acute, exfoliative, nummular, stasis, seborrhea and dyshidrotic eczema were also not included in this research. This research was laid down through Purposive sampling strategy, data was collected from OPDs with the aid of a questionnaire. Following instruments were used in the study i) Patient Oriented Eczema Measure (POEM) This tool was devised by Charman, R., Ven, A., Williams, H. at University of Nottingham to monitor the intensity of eczema in patients as experienced by them. Cronbach alpha value of POEM in this study was analyzed after pilot testing and it was .72 which is considered fair and acceptable. ii) Eczema Area and Severity Index (EASI) This tool measures the severity of eczema and also calculates the region of patient's body affected from it. It consists of three items. However in this study only

two questions from EASI scale were used. The percentage involvement of the area effected was not included as it was found after pilot testing that the respondents experienced great difficulty while answering it. Cronbach alpha value computed after pilot testing in this study prior to adaptation was .74 and after adaptation was .83 which indicates a good alpha value. iii) Interior Design Eczema Allergens. A questionnaire was established based around the indicators gathered from the existing literature. The indicator tool was divided into six parts based on the irritants afore mentioned in the introduction. Reliability of each item was studied prior to its full scale use. Furthermore reliability analysis of the complete questionnaire was also computed before full scale data gathering and it was found to be .84 a good Cronbach alpha value. Keeping in view the ethical aspects of research, enough time was given to the respondents to respond to every question. Consent form was provided to the respondents prior to data gathering to ensure their voluntary participation in this study. The information obtained was kept confidential; no information regarding any participant was disclosed to anyone. Furthermore no participant was asked for any kind of experimentation on their skin. Neither any of the participant was asked to discontinue the use of medication which they were using.

FIGURE 3.1. EFFECTED REGIONS OF PATIENT'S BODIES.

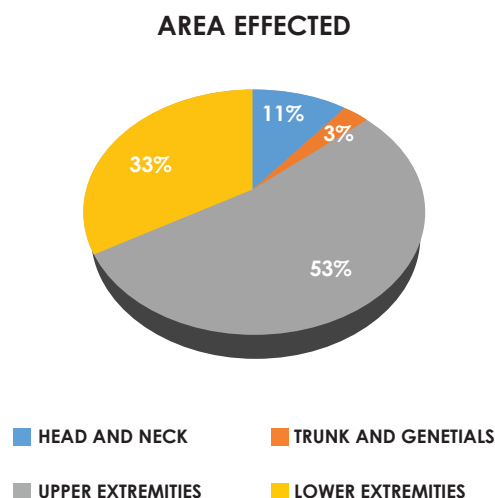


TABLE 3.2. COMPARISON OF DISEASE SEVERITY AMONG MALES AND FEMALES

Gender	Mean	N
Males	21.73	51
Females	19.21	51

**TABLE 3.3. RELATIONSHIP BETWEEN INTERIOR DESIGN ELEMENTS & SEVERITY OF ATOPIC ECZEMA EXPERIENCED MALES AND FEMALES PATIENTS**

SOURCE	TYPE III SUM OF SQUARES	DF	MEAN SQUARE	F	SIG
BETWEEN GROUPS	59.67	5	5.43	16.20	16.20
WITHIN GROUPS	155.95	97	3.19		
TOTAL	215.62	102			

The table above indicates that there exists a relationship between interior design elements and severity of atopic eczema experienced by males and females. The test was conducted at a confidence interval of 95%

**TABLE 3.3.1 MALE PATIENT'S OPINION REGARDING INTERIOR DESIGN ELEMENTS EFFECT ON ATOPIC ECZEMA.**

GENDER	INTERIOR ELEMENTS	MEAN	LOWER BOUND	UPPER BOUND
MALE	AIR & MOISTURE	2.67	2.26	3.07
MALE	FABRICS	2.64	2.31	2.97
MALE	RUGS & CARPETS	3.79	3.38	4.19
MALE	PAINT	3.93	3.53	4.33
MALE	WALLPAPER	2.53	2.12	2.94
MALE	PLANTS	2.17	1.82	2.52

The above table depicts Post Hoc analysis Bonferoni results, it was found that among male eczema patient's the most irritating interior design element was paints while the least irritating element was indoor plants.

**TABLE 3.3.2. FEMALE PATIENT'S OPINION REGARDING INTERIOR DESIGN ELEMENTS EFFECT ON ATOPIC ECZEMA.**

GENDER	INTERIOR ELEMENTS	MEAN	LOWER BOUND	UPPER BOUND
FEMALE	FABRICS	4.17	3.76	4.57
FEMALE	CARPETS & RUGS	3.81	3.41	4.21
FEMALE	AIR & MOISTURE	4.09	3.69	4.50
FEMALE	PAINT	3.94	3.53	4.35
FEMALE	WALLPAPER	2.11	1.70	2.51
FEMALE	PLANTS	3.44	3.09	3.78

Among female patients as indicated in the table above results of Post Hoc analysis – Bonferoni, fabric coverings was the most eczema instigating element, whereas wall paper was the least irritating element.

**TABLE 3.4. ASSOCIATION BETWEEN INTERIOR DESIGN ELEMENTS ROLE IN EXACERBATING ECZEMA WITH AGE OF THE PATIENTS**

SOURCE	TYPE III SUM OF SQUARES	DF	MEAN SQUARE	F	SIG
BETWEEN	6.19	5	1.03	3.39	.000
WITHIN	155.95	97	3.19		
GROUP	28.85	97	.304		
TOTAL	35.05	102			

It is depicted by the table above that there exists a relationship between patient's age and role of

interior design in exacerbation of atopic eczema.

**TABLE 3.4.1. DIFFERENCE AMONG AGE GROUPS AND SEVERITY IN DISEASE DUE TO INTERIOR DESIGN ELEMENTS**

	MEAN	LOWER BOUND	UPPER BOUND
20-30	2.5	3.21	1.8
31-40	2.8	3.00	2.6
41-50	3.49	3.56	3.43
51-60	3.52	3.59	3.46
60-above	3.50	3.57	3.42

The table above depicts different age groups and severity of eczema experienced by them. It was found that (51-60) age group was the most effected while (20-30) age group experienced mild eczema.

**TABLE 3.5. CORRELATION BETWEEN INTERIOR DESIGN ELEMENTS AND DISEASE SEVERITY**

VARIABLE1	VARIABLE2	CORRELATION COEFFICIENT	P-VALUE	N
ATOPIC ECZEMA	PAINT	.52	<.005	102
	INDOOR PLANT	.26	<.005	102
	WALL PAPERS	.12	<.005	102
	RUGS & CARPETS	.31	<.005	102
	FABRIC COVERINGS	.79	<.005	102
	AIR & MOISTURE	.77	<.005	102

There exists a positive correlation between severity in atopic eczema and interior design elements. The results indicated that there exists a weak correlation between wallpapers; plants and severity in eczema, while a moderate correlation was found between rugs and carpets and eczema severity. A strong correlation existed between severity in atopic eczema; paint, air and fabrics correlation coefficient

**TABLE 3.6. INTERIOR DESIGN ELEMENTS WHICH CAUSE AN INCREASE IN ECZEMA (REGRESSION MODEL)**

VARIABLE 1	VARIABLE 2	R-SQUARE	F	P-VALUE	UN-STANDARDIZED BETA COEFFICIENT	DF
ATOPIC ECZEMA	PAINT	.09	7.80	<.005	3.29	(5.97)
	PLANTS	.04	.276	<.003	2.19	(5.97)
	WALL PA-	.03	.777	<.005	2.33	(5.97)
	RUGS & CARPETS	.07	.276	<.005	2.19	(5.97)
	FABRIC COVERINGS	.14	.631	<.005	1.84	(5.97)
	AIR & MOISTURE	.11	1.07	<.005	1.36	(5.97)

The table above depicts results of regression model.

## DISCUSSION

Atopic Eczema also known as Atopic Dermatitis is a disease which belongs to the class of atopic diseases and are allergenic in nature. Since these diseases are passed on in families they are not contagious in nature and are not passed on due to physical contact with the victim

Atopic Eczema surfaces in four stages ranging in severity from mild to severe.<sup>(13)</sup> The disease begins with acute dryness coupled with an intense desire to itch. This stage is called erythema. At this stage the dryness is so severe that the skin becomes sore, inflammable and cracks starts appearing. The second stage of eczema is edema, the skin starts swelling up and becomes thin and with the appearance of lesions and seizures the thirds stage onsets called excoriation. The skin starts to crack open and out of these cracks and punctures beads of blood start oozing out. This stage is also known as the weeping stage of eczema. After blood ceases to flow due to formation of blood clot. The skin becomes leathery thick and purplish with exaggerated markings on it marking fourth stage. This stage has social stigma attached with it as it leaves behind patches and blotches on the skin.

In order to study the role of home environment in exacerbation of atopic dermatitis, interior design elements were categorized into six factors/allergens present inside homes (paint, wall paper, indoor plantation, air and moisture, fabric coverings and rugs & carpets). A pilot study was conducted of the tool and its reliability was found to be .84. The questionnaire comprised of EASI tool, POEM, an indigenous demographic sheet and an indicator tool for eczema triggering interior environment allergens. After SPSS analysis the results indicate that both the hypotheses constructed for the study were significant.

One way ANOVAs were conducted to test both the hunches aforementioned in the introduction (H1: Interior design elements present inside Pakistani homes have the potential to cause relapsing eczema in male and female patients.& H2: Home environment interior design elements result in flared eczema among patients of different age groups) the hypotheses formulated for the study were found significant. (Table 3.3)The test revealed that the overall results were significant with 16.20 (5, 97) =215.62;  $p < .005$ . (Table 3.3.1) It was found that paint was the most responsible factor in exacerbation of eczema in males with (M=3.93), rugs & carpets were second with (M=3.79), air & moisture was third allergen with (M=2.67); with a (M=2.64) fabrics were fourth. Wall paper was fifth (M=2.53) and indoor plants were sixth factor which causes an increase in eczema among males with (M= 2.17). Furthermore in case of females (Table 3.3.2.) results indicated that the most responsible factor in exacerbation of eczema was (M=4.17) fabrics, air & moisture was second with (M=4.09), paint third with (M=3.94); with a (M=3.81) carpet and rugs were fourth and indoor plants were fifth with (M=3.44) while wallpaper was the least triggering allergen with a (M=2.11). Furthermore the results also indicated that with an increase in age the sensitization of atopic dermatitis patients to home environment allergens increased,

which depicts that with age the immunization barrier starts deteriorating. Results of regression analysis revealed that paint contributed 9% to the overall model strengthening the findings of <sup>(2)</sup> and <sup>(14)</sup> that isothiazolinones are a health hazard for patients of dermatitis and such individuals should refrain from inhabiting freshly painted rooms. Plants had a 4% share in the overall model supported by <sup>(15)</sup>, <sup>(8)</sup> and by <sup>(7)</sup>.Wallpapers share was even less as compared to plants supported by the works of <sup>(12)</sup> and contradicting the findings of <sup>(10)</sup> While rugs and fabric coverings had a larger share in the overall model 7% and 14 % respectively supported by <sup>(16)</sup>, <sup>(17)</sup> and <sup>(4)</sup>. Air quality and moisture inside the home had the largest share in interior design allergens with a contribution of 11% supported by <sup>(6)</sup> and contradicting the findings of <sup>(5)</sup>. Hence it was determined that though such diseases are inherited and genetics are the primary cause behind but environment in which a person lives plays a pivotal role, by instigating the disease and by increasing its frequency and intensity as well.

## CONCLUSION

Since this study is a cross sectional survey in which the stipulated criteria demanded the participants to be literate therefore illiterate people were not made a part of this study. However it is recommended to the future researchers to conduct study on those skilled worker who are unfortunately illiterate but are a victim of the disease as well such as paint workers, as the researcher came across studies which highlighted that paint workers and maids are more vulnerable to contact eczema due to the chemicals which are used in paints and detergents. Lastly, this study was constructed with a cross-sectional survey design. It is recommended to the future researchers to conduct control experiments by planning the intervention on the already severe cases instead of mild or moderate ones. Which will help them in devising eczema combating strategies.

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