

## Prevalence of Pediatric Atopic Dermatitis in Iran: A Systematic Review and Meta-Analysis

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### Abstract

**Background:** Atopic dermatitis (AD) is one of the skin diseases, which is characterized as a chronic inflammation of the skin with itchy red rashes. This systematic review study was performed with the aim of determining the prevalence of AD in children and adolescents in Iran.

**Method:** The search keywords included Atopic dermatitis, Child, Children, pediatrics, adolescent, Preschool children, School-age children, eczema, and Iran, in the domestic databases of Iran and international databases. After the initial search of the articles and studying their titles and abstracts, those that did not match the purpose of the research were removed from the study, and then the methodology and results of the papers were studied. Then the data was analyzed using CMA version 3 software.

**Result:** The results of 30 articles were analyzed. Based on the results, the prevalence of AD in girls was 8.5% (confidence interval (CI) = 5.3-13.4), in boys it was 8.1% (confidence interval (CI) = 5.5-11.7), and the overall prevalence was 7.4% (confidence interval (CI) = 5.3-10.3).

**Conclusion:** AD is found to have a considerable prevalence among children, though the prevalence found in this study is, generally, lower than those suggested in other studies. Overall, more efforts are necessary to reduce its prevalence.

**Key Words:** Atopic Dermatitis, Children, Eczema, Meta-analysis, Skin allergy, Systematic review.

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## 1- INTRODUCTION

Asthma and allergies are among chronic diseases (1-3). In the last century, the prevalence of allergic diseases has increased and there are different types of allergic diseases such as respiratory and skin allergy (4, 5). AD is one of the skin diseases, which is characterized as a chronic inflammation of the skin with itchy red rashes (6). AD is known as "Atopic eczema" or "Eczema" and despite the efforts of healthcare professionals to identify its causes and treatment, a complete treatment method has not been determined yet (7).

There are different kinds of eczema classifications based on etiology and site. Based on etiology, it is divided into exogenous and endogenous groups, while based on sites, it is divided into hand eczema (HE), genital area, eyelid, etc. (8, 9). Both genetic factors and environmental factors are involved in the prevalence of eczema. Among the environmental changes that cause allergic factors are: weather, exposure to environmental allergens, urbanization and inappropriate lifestyle (10). Eczema can cause itching, swelling, frequent skin rashes, sleep disorders, reduced physical and mental growth, or even asthma or rhinitis (11-13).

This disease is prevalent in childhood, but it may affect a wide range of people, including middle-aged and adults. AD can cause a lot of complications in the quality of life and social well-being of patients. Also, when this disease is associated with other diseases such as asthma and food allergies, it can have more destructive effects on the health of patients (14, 15). It was shown that the amount of stress, anxiety, depression, absenteeism from school and suicidal thoughts in children with AD were higher than in other groups (16). In addition to physical and mental problems, AD can cause care pressure and financial burden for the patient's family (17).

The dermatological symptoms of AD undergo changes with age and patients report different and unique characteristics according to their age (18). In fact, various types of chronic and non-chronic diseases appear in childhood, and their early diagnosis and treatment is a priority (19-21). AD is one of the diseases that have a high prevalence in children (22).

The prevalence of AD in Iran has been studied in different investigations. Dastoorpoor et al. (2022) reported it as 1.3% (25) in Khuzestan; Sahebi et al. (2011) reported the prevalence of AD in Tabriz as 7.3% (23); Bazzazi et al. (2007) in Gorgan reported it as 19% (24); and in the study of Nasiri et al. (2016) in Kurdistan it was found to be 37.6% (26).

### 1-1. Purpose of the study

According to the above results in the field of AD prevalence, the available data are not similar, so it is necessary to perform a meta-analysis in this field. Also, considering the importance of identifying the prevalence of diseases and their complications, this meta-analysis study was performed with the purpose of determining the prevalence of AD in Iran.

## 2- MATERIALS AND METHODS

Inclusion criteria were conducting the study in Iran and publishing it in Persian or English, examining the age group of children and adolescents, and reporting the prevalence of AD as frequency or percentage. Exclusion criteria included lack of access to the full file of the article, congress articles, and systematic and interventional reviews. The search period was from 2000 to 2022 using AND-OR-NOT as the search strategy.

The search keywords included Atopic dermatitis, Atopic eczema, Child, Children, pediatrics, adolescent, Preschool children, School-age children, eczema, and Iran, in the domestic databases of Iran and international databases. After the initial

search of the articles and studying their titles and abstracts, those that did not match the aim of the research were removed, and then the methodology and results of the papers were studied. If these studies met the inclusion criteria, the

research team specialized in systematic review studies, extracted the data related to children and allergies (**Table 1**). Then the data was analyzed using CMA version 3 software.

**Table-1:** Final articles on the prevalence of AD

No.	Author (year of publication)	City	N			%		
			Girls	Boys	Total	Girls	Boys	Total
1	Dastoorpoor et al (2022) (25)	Khuzestan	3355	3989	8000	-	-	1.3
2	Zamanfar et al (2016) (27)	Mazandaran	1980	982	2967	9.64	17.10	15
3	Ahmadiafshar et al (2020) (28)	Zanjan	383	417	800		-	4.1
4	Ghalenoei et al (2021) (29)	Zahedan	770	830	1600	7.1	6.7	6.9
5	Nafei et al (2021 ) (30)	Yazd	3069	2072	5141	2.7	3.1	2.9
6	Farrokhi et al (2014) (31)	Bushehr	-	-	1115	-	-	19
					1280	-	-	12.1
7	Ghaffari et al (2012) (32)	Sari	640	1178	1818	36.3	24.7	22.8
8	Ghaderi et al (2012) (33)	Birjand	412	398	810	15.8	12.8	14.3
9	Moosavi et al (2005) (34)	Ahvaz	1250	1250	2500	4.3	3.4	3.9
10	Hassanzadeh et al (2012) (35)	Shiraz	1500	1500	3000	27.2	9.4	18.3
11	Gooya et al (2017) (36)	Bushehr	-	-	190	-	-	11.6
			-	-	223	-	-	14.3
12	Nasiri et al (2016) (26)	Kurdistan	2069	1809	3878	-	-	37.6
13	Bazzazi et al (2007) (24)	Gorgan	1484	1316	2800	18.3	19.8	19
14	Qargazlu et al (2003) (37)	Kashan	1503	1500	3003	3.1	2.6	2.85
15	Shakurnia et al (2011) (38)	Ahvaz	1640	1290	2930	6	5.3	5.7
16	Rahimi Rad et al(2008) (39)	Urmia	-	-	2999	-	-	2.7
17	Sahebi et al (2011) (23)	Tabriz	715	793	1508	-	-	7.3
18	Hajavi et al (2012) (40)	Gonabad	751	876	1626	-	-	1.7
19	Assadi et al (2014) (41)	Bushehr	-	-	516	-	-	13.8
	Assadi et al (2014) (41)				569			19.5
20	Mohammadzadeh et al (2008) (42)	Babol	3141	2792	5933	2.6	6.7	4.5
21	Farajzadeh et al (2014) (43)	Kerman	-	-	865	-	-	9.1
22	Ahmadi et al (2009) (44)	Kerman	75	75	150	-	-	1.3
			222	228	450	-	-	3.1
23	Nabavi et al (2014) (45)	Tehran	163	217	380	11.04	13.82	12.6
24	Noorbala et al (2010) (46)	Yazd	153	150	303	12.4	14	13.2
25	Ghaini et al (2021) (47)	Tehran	-	-	313	-	-	6.7
26	Golshan et al (2002) (48)	Isfahan	1943	1981	3924	10.3	8.3	9.3
27	Shabestari et al (2011) (49)	Tabriz	-	-	1508	-	-	7.3
28	Tolide-ie et al (2012) (50)	Gonabad	-	-	1626	-	-	1.7
29	Gharagouzlou et al (2003) (51)	Kashan	1503	1500	3000	3.1	2.6	2.85
30	Karimi et al (2006) (52)	Yazd	-	-	3151	-	-	14.8

### 3- RESULT

In the initial search, which was performed independently by two members of the research team, a total of 686 articles were found, from which 30 articles were included in the meta-analysis stage after expert reviews.

The prevalence of AD in girls was 8.5% (confidence interval (CI) = 5.3-13.4) (Fig. 1), in boys it was 8.1% (confidence interval (CI) = 5.5-11.7) (Fig. 3), and the overall prevalence was found to be 7.4% (confidence interval (CI) = 5.3-10.3) (Fig. 5). Bias publication status for girls is

shown in Fig. 2 (Q-value=1419.739, I-squares=99.104, T au Squared=1.014), for boys is shown in Fig. 4 (Q-value=831.029, I-squares=98.315, T au Squared= 0.647) and for all patients in Fig. 6 (Q-value=4969.721, I-squares=99.356, T au Squared=1.67).

The highest reported prevalence of AD was 37.6%, in the study by Nasiri et al. (2016) in Kurdistan with a sample size of 3878 (26), and the lowest rate was 1.3% reported by Dastoorpoor et al. (2022) in Khuzestan with a sample size of 8000 people (Table 1) (25).

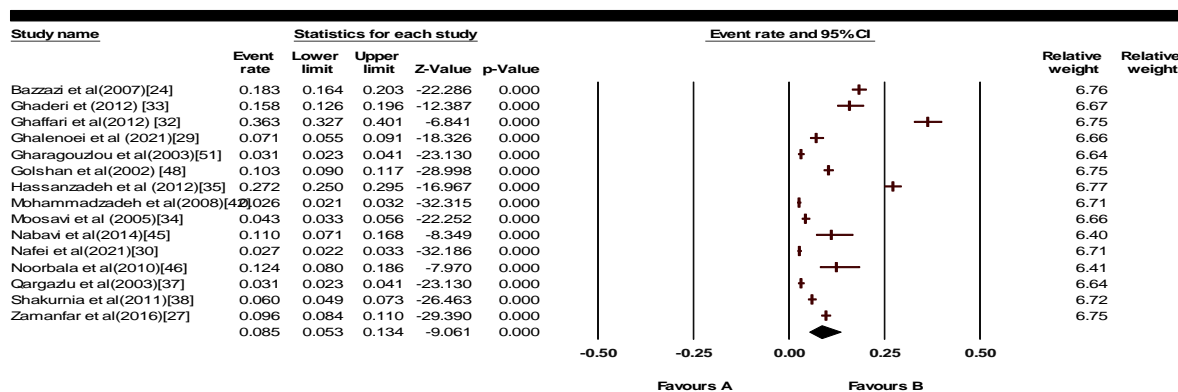


Fig. 1: Prevalence of AD in Iranian female children

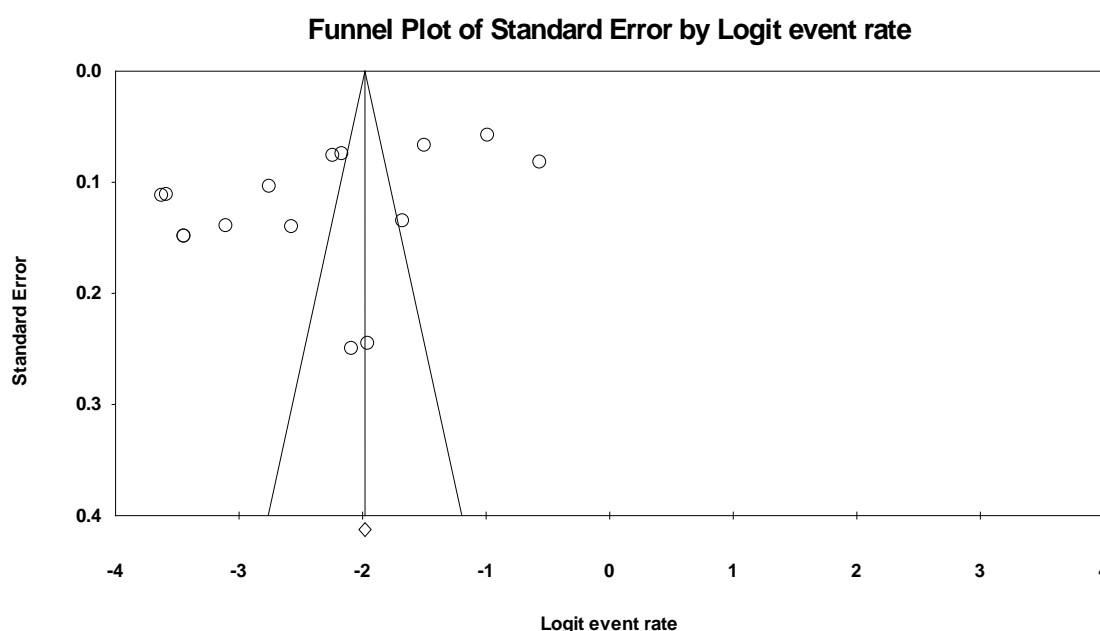


Fig. 2: Publication bias for the prevalence of AD in Iranian girls

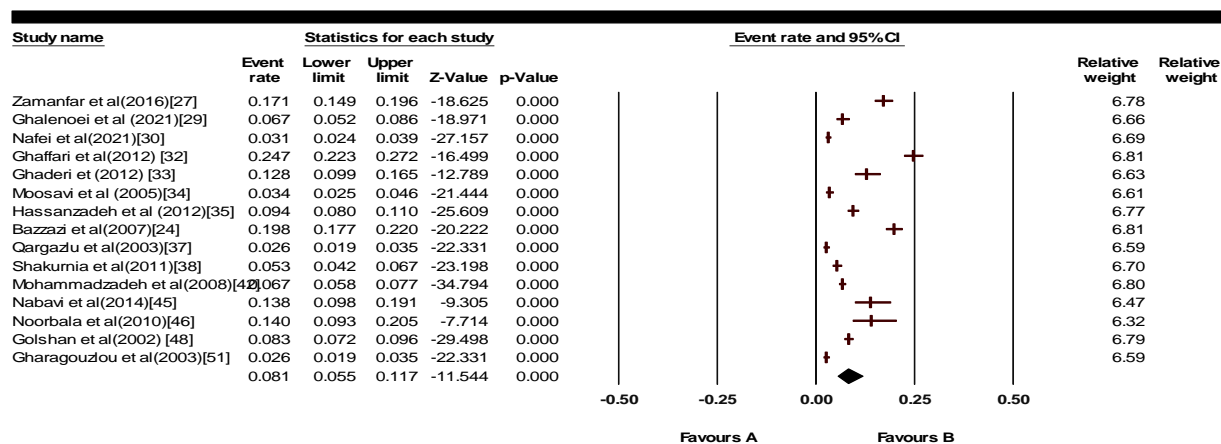


Fig. 3: Prevalence of AD in Iranian male children

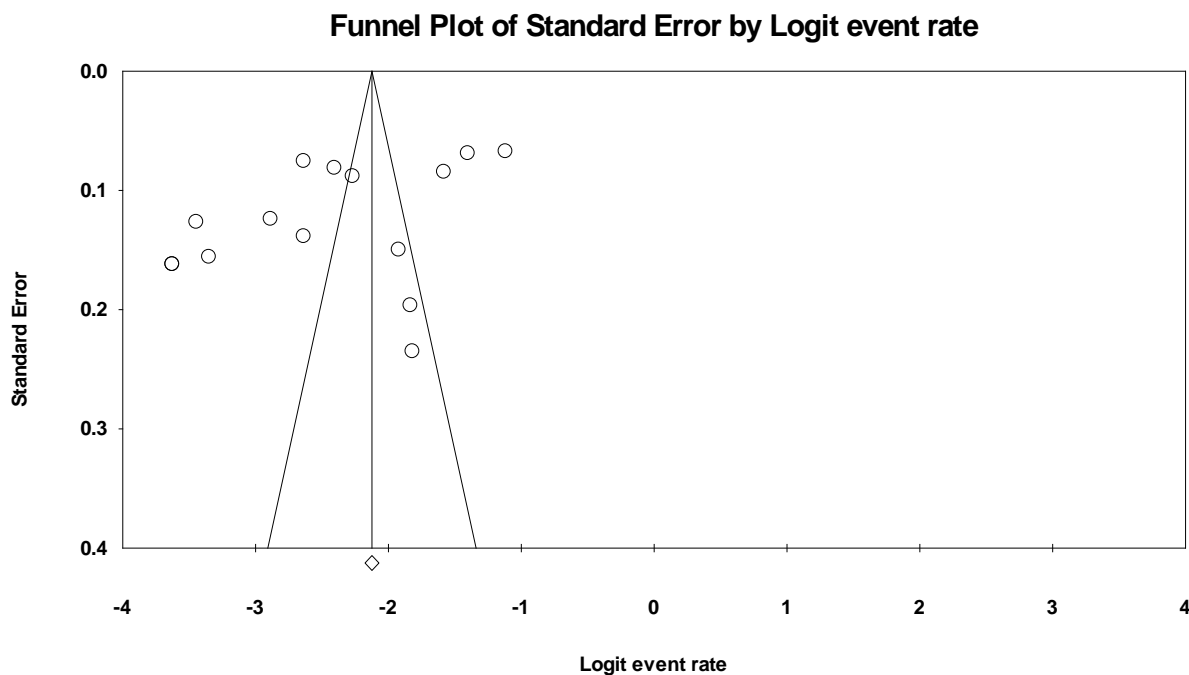


Fig. 4: Publication bias for the prevalence of AD in Iranian Boys

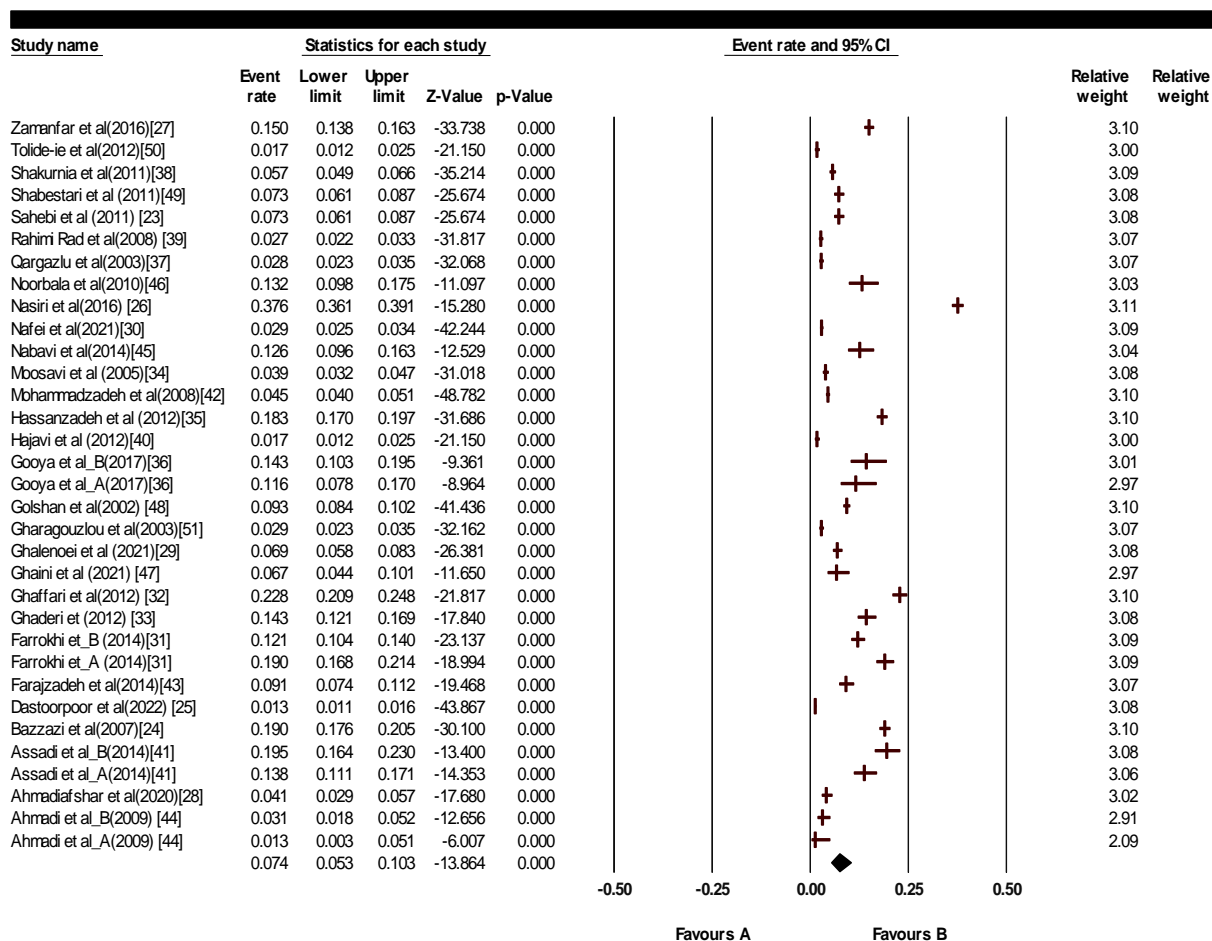


Fig. 5: Prevalence of AD in Iranian girls

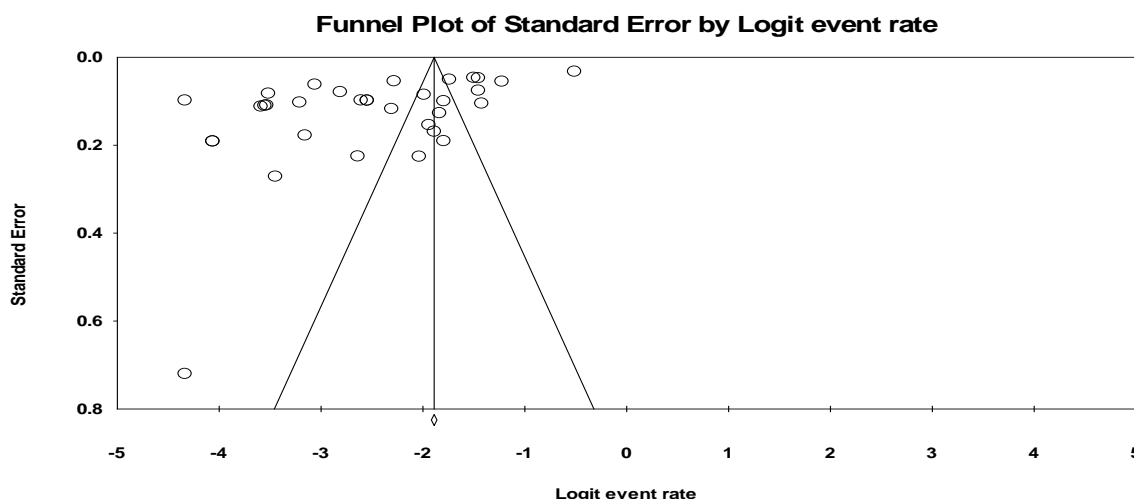


Fig.6: Publication bias for the prevalence of AD in Iranian children

4- DISCUSSION

In this meta-analysis, the prevalence of AD in girls was found to be 8.5%

(confidence interval (CI) = 5.3-13.4), in boys it was 8.1% (confidence interval (CI) = 5.5-11.7), and the overall prevalence was

7.4% (confidence interval (CI) = 5.3-10.3). In the study of Andersson et al., 839 children in the age range of 0-7 years were examined and the overall prevalence decreased with increasing age and was equal to 35%. Actually, it had the highest amount in one-year-old children and in the age range of 1-6 years, it was 29-41%. (55). Johansson et al. performed a cohort study on 3055 patients, in which the prevalence of AD at the age of 24 was 17.8%, the point prevalence according to clinical examinations was 8%, in hands it was 39.8%, in trunk it was 32.2%, in scalp 29.7%, in face 28.9%, in Buttocks 17.9%, in feet 14.0%, and in Neck or throat it was 30.0% (56). In the study of Ha et al., the prevalence of AD from 2008 to 2017 in infants ranged from 5.9% (2016-2017) to 14.1% (2008-2009), and in preschool children, it was between 11.3% (2016-2017) and 19.7% (2008-2009); and in school-age children it was reported to be between 12.4% (2008-2009) and 15.5% (2013-2015) (57). In these studies, the prevalence of AD was higher than the overall prevalence of AD in this study as 7.4%.

Some other studies have demonstrated lower prevalence rates in adults as compared to pediatric patients. Among these studies, we can refer to the study by Bylund et al., in which the prevalence of AD was reported as 1.2% in Asian adults, and 0.96% to 22.6% in Asian children; and in European adults it was reported as 1.17% (58). In the study by Abuabara et al., the prevalence of AD was variable, equal to 34% at the age of 12 years and 6% at the age of 26 years (59), giving a further emphasize on the possible effects of demographic factors such as age on AD.

Moreover, various studies, from different perspectives, have been done in this field. In the study of Larese Filon et al., AD incidence was investigated among the healthcare group, and it was found to be between 0.6 and 6.7% of every 10,000

reports (60). In another study, Kim et al. reported that the persistence of AD after birth was equal to 3.0 years (61). Yet another study by Yousaf et al. revealed that AD was associated with increased blood pressure (62), suggesting that it is necessary to conduct a study in the field of dermatitis.

Furthermore, AD patients face various complications. Ravnborg et al. reported the prevalence of asthma in these patients as 25.7% (53), and in the study by Xie et al., people with AD had a higher risk of mental disorders (54). Hence, it is very important to investigate the prevalence of complications, as well.

## 5- CONCLUSION

AD is found to have a considerable prevalence among children, though the prevalence found in this study is, generally, lower than those suggested in other studies. Overall, more efforts are necessary to reduce its prevalence.

## 6- ACKNOWLEDGEMENTS

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## 7- COMPETING INTERESTS

None.

## 8- AVAILABILITY OF DATA AND MATERIALS

Available by request.

## 9- REFERENCE

1. Irdawati, Permata Sury MC: Asthma Recurrent in Children: Parental Knowledge Along with Medical Treatment. *Journal of Medicinal and Chemical Sciences* 2022, 5(5):667-675.
2. Abdolkarimi B, Javaheri J, Sedighi I, Garmsiri M, Sedighi S: Investigating the Prevalence of Childhood Asthma Symptoms in Khomein Town, Markazi Province, Iran: A Cross-Sectional Study. *International Journal of Advanced Biological and Biomedical Research* 2019, 7(2):105-112.

3. Naimi M: Effective of Sick Building Syndrome on Irritation of the Eyes and Asthma. *International Journal of Advanced Biological and Biomedical Research* 2013, 1(12):1529-1534.
4. Feng H, Chen Y, Xiong X, Xu Q, Zhang Z, Xi Q, Wu Y, Lu Y: Association of nutrients intake during pregnancy with the risk of allergic disease in offspring: a meta-analysis of prospective cohort studies. *Food Science and Human Wellness* 2023, 12(3):711-719.
5. Bunne J, Hedman L, Perzanowski M, Bjerg A, Winberg A, Andersson M, Lundbäck B, Platts-Mills T, Rönmark E: The majority of children sensitized before school-age develop allergic disease before adulthood: a longitudinal population-based study. *The Journal of Allergy and Clinical Immunology: In Practice* 2022, 10(2):577-585. e573.
6. Shi H, Wan G, Wang T, Zhu J, Jiang L, Ma S, Yao J, Yin Z, Maimaiti M, Dong H: Prevalence and influencing risk factors of eczema among preschool children in Urumqi city: a cross-sectional survey. *BMC pediatrics* 2021, 21(1):1-8.
7. Ferrandiz-Mont D, Wahyuniati N, Chen HJ, Mulyadi M, Zanaria TM, Ji DD: Hygiene practices: Are they protective factors for eczema symptoms? *Immunity, inflammation and disease* 2018, 6(2):297-306.
8. Thyssen JP, Schuttelaar ML, Alfonso JH, Andersen KE, Angelova-Fischer I, Arents BW, Bauer A, Brans R, Cannavo A, Christoffers WA: Guidelines for diagnosis, prevention, and treatment of hand eczema. *Contact dermatitis* 2022, 86(5):357-378.
9. Vandeweege S, Debaene B, Lapeere H, Verstraelen H: A systematic review of allergic and irritative contact dermatitis of the vulva: the most important allergens/irritants and the role of patch testing. *Contact Dermatitis* 2022.
10. Ochoa-Avilés C, Morillo D, Rodriguez A, Cooper PJ, Andrade S, Molina M, Parra M, Parra-Ullauri A, Mejía D, Neira A: Prevalence and risk factors for asthma, rhinitis, eczema, and atopy among preschool children in an Andean city. *PloS one* 2020, 15(7):e0234633.
11. Von Kobyletzki LB, Bornehag C-G, Hasselgren M, Larsson M, Lindström CB, Svensson Å: Eczema in early childhood is strongly associated with the development of asthma and rhinitis in a prospective cohort. *BMC dermatology* 2012, 12(1):1-9.
12. Schmitt J, Chen CM, Apfelbacher C, Romanos M, Lehmann I, Herbarth O, Schaaf B, Kraemer U, Von Berg A, Wichmann HE: Infant eczema, infant sleeping problems, and mental health at 10 years of age: the prospective birth cohort study LISApplus. *Allergy* 2011, 66(3):404-411.
13. Shi H, Wan G, Wang T, Zhu J, Jiang L, Ma S, Yao J, Yin Z, Maimaiti M, Dong H: Prevalence and influencing risk factors of eczema among preschool children in Urumqi city: a cross-sectional survey. *BMC Pediatrics* 2021, 21(1):347.
14. Harris VR, Cooper AJ: Atopic dermatitis: the new frontier. *Medical Journal of Australia* 2017, 207(8):351-356.
15. Nutten S: Atopic dermatitis: global epidemiology and risk factors. *Annals of nutrition and metabolism* 2015, 66(Suppl. 1):8-16.
16. Rønnstad ATM, Halling-Overgaard A-S, Hamann CR, Skov L, Egeberg A, Thyssen JP: Association of atopic dermatitis with depression, anxiety, and suicidal ideation in children and adults: a systematic review and meta-analysis. *Journal of the American Academy of Dermatology* 2018, 79(3):448-456. e430.
17. Fasseeh AN, Elezbawy B, Korra N, Tannira M, Dalle H, Aderian S, Abaza S, Kaló Z: Burden of atopic dermatitis in



adults and adolescents: a systematic literature review. *Dermatology and Therapy* 2022, 12(12):2653-2668.

18. Houshmand H, Ghaemi MR, Maddah MM, Javadi AA, Houshmand G: Relationship between Vitamin D3 Levels and Severity of Atopic Dermatitis in Infants and Children. *Journal of Mazandaran University of Medical Sciences* 2021, 31(202):136-141.

19. Shokri M, Tarjoman A, Borji M, Solaimanizadeh L: Investigating psychological problems in caregiver of pediatrics with cancer: A systematic review. *Journal of Child and Adolescent Psychiatric Nursing* 2020, 33(4):229-238.

20. Hatefi M, Abdi A, Tarjoman A, Borji M: Investigating the prevalence of Musculoskeletal Pain among Iranian Children and Adolescents: a systematic review and meta-analysis. *Journal of Pediatrics Review* 2019, 7(4):191-198.

21. Gholami A, Hemati R, Khorshidi A, Borji M, Kafashian M, Kalvandi G, Tarjoman A, Mahdikhani S, Shokri M: The prevalence of clinical symptoms in children and adolescents with Covid-19: A systematic review and meta-analysis study. *International Journal of Pediatrics* 2020, 8(10):12177-12188.

22. Hidayati AN, Sawitri S, Sari DW, Prakoeswa CRS, Indramaya DM, Damayanti D, Zulkarnain I, Citrashanty I, Widia Y, Anggraeni S: Efficacy of vitamin D supplementation on the severity of atopic dermatitis in children: A systematic review and meta-analysis. *F1000Research* 2022, 11(274):274.

23. Sahebi L, Shabestary MS: The prevalence of asthma, allergic rhinitis, and eczema among middle school students in Tabriz (northwestern Iran). *Turkish Journal of Medical Sciences* 2011, 41(5):927-938.

24. Bazazi H, Gharagozlou M, Kassai M, Zahmatkesh H, Parsikia A: The prevalence

of asthma and allergic disorders among school children in Gorgan. 2007.

25. Dastoorpoor M, Khodadadi N, Madadzadeh F, Raji H, Shahidizadeh E, Idani E, Shoushtari MH: Assessing the prevalence and severity of asthma, rhinitis, and eczema among schoolchildren (6–7 and 13–14 years old) in Khuzestan, Iran: a cross-sectional survey. *BMC pediatrics* 2022, 22(1):1-10.

26. Nasiri Kalmarzi R, Ataee P, Homagostar G, Tajik M, Shekari A, Roshani D, Ghobadidana V, Nili S: Prevalence of Atopic Dermatitis Symptoms among Students in Kurdistan: a North-west Province of Iran. *International Journal of Pediatrics* 2016, 4(1):1205-1214.

27. Zamanfar D, Gaffari J, Behzadnia S, Yazdani-Charati J, Tavakoli S: The Prevalence of Allergic Rhinitis, Eczema and Asthma in Students of Guidance Schools in Mazandaran Province, Iran. *Open Access Maced J Med Sci* 2016, 4(4):619-623.

28. Ahmadiafshar A, Nourollahi S, Arminpour A, Faghihzadeh S: The Prevalence and Risk Factors of Asthma, Allergic Rhinitis, and Eczema in Primary School Children, Zanjan, Iran. *Journal of Advances in Medical and Biomedical Research* 2020, 28(130):230-236.

29. Ghalenoei AA, Ansari H, Payandeh A, Arbabi Sarjou A, Soleimani G, Meshkinian A: Prevalence and Determinants of Eczema Among Elementary School Children, Southeast of Iran, 2019. *Journal of Arak University of Medical Sciences* 2021, 24(3):438-449.

30. Nafei Z, Behniafard N, Mirzaei M, Karimi M, Akbarian E: Prevalence of Allergic Rhinitis and Eczema in Adolescents Living in Yazd City: Part of Global Asthma Network Survey Allergic Rhinitis and Eczema in Yazd adolescents.

Iranian Journal of Allergy, Asthma and Immunology 2021, 20(3):271.

31. Farrokhi S, Gheybi MK, Movahhed A, Dehdari R, Gooya M, Keshvari S, Gholampour H, Mansourian Z, Khosravi Y, Ghahramani F: Prevalence and risk factors of asthma and allergic diseases in primary schoolchildren living in Bushehr, Iran: phase I, III ISAAC protocol. *Iranian Journal of Allergy, Asthma and Immunology* 2014:348-355?

32. Ghaffari J, Mohammadzadeh I, Khalilian A, Rafatpanah H, Mohammadjafari H, Davoudi A: Prevalence of asthma, allergic rhinitis and eczema in elementary schools in Sari (Iran). *Caspian journal of internal medicine* 2012, 3(1):372.

33. Ghaderi R, Tabiee S, Peyrovi S, Jafari Pour M: Prevalence of atopic dermatitis and its risk factors in 2-5 years old children at kindergartens of Birjand city (2008). *Journal of Birjand University of Medical Sciences* 2012, 19(3):286-293.

34. Moosavi Z, Samadzadeh D: Prevalence of Atopic Dermatitis in 7-11 Year Old School Children, Ahwaz. *The Journal of Shahid Sadoughi University of Medical Sciences* 2006, 14(3):38-44.

35. Hassanzadeh J, Basiri F, Mohammadbeigi A: Prevalence of asthma symptoms and allergic diseases with ISSAC method in children, Shiraz 2009. *Zahedan Journal of Research in Medical Sciences* 2012, 13(8).

36. Gooya M, Shirkani A, Tahmasebi R, Omrani A, Gheybi MK, Darabi H, Farrokhi S: Prevalence of Asthma and Allergic Diseases and Its Risk Factors in School Children Aged (6-7 and 13-14 Years) in Assalouyeh City, Bushehr Province Based on III ISAAC Protocol Phase I, in 2014. *Iranian South Medical Journal* 2017, 20(1):57-69.

37. Qargazlu M, Khalili K, Halaj Mofard M, "Determining the frequency of

symptoms of asthma, allergic rhinitis and eczema in 12-14-year-old students of Kashan city In the academic year 1377-78," *Daneshvar Bezizi*, vol. 11, no. 47, pp. 49-56, 2003, (Online). Available: <https://sid.ir/paper/30657/fa>.

38. Shakurnia A, Assar S, Afra M, Latifi S: Prevalence of symptoms of asthma, allergic rhinitis and eczema in 6-7 and 13-14 years old Ahvazian school children. *Scientific Medical Journal (AJUMS)* 2011, 9(6):592-603.

39. Rahimi Rad M, Hamzezhadeh A: Allergic disease in 6-7-year-old schoolchildren in Urmia, Islamic Republic of Iran. *EMHJ-Eastern Mediterranean Health Journal*, 14 (5), 1044-1053, 2008

40. hajavi j, Tolide-ie HR, Rastgoie Chavoshlu S, Salehi Rezve m, Modoodi Yaghooti M, Rahimi J: Do Rural and Urban Children Have Different Prevalence of Allergic Disorders in Gonabad? *Internal Medicine Today* 2012, 18(2):21-26.

41. Assadi T, Gheybi M, Shirkani A, Movahed A, Khoddami S, Ashourinejad A, Farrokhi S: Study of Prevalence and Risk Factors of Asthma and Allergic Diseases Among School Children (6-7 and 13-14 years) Based on ISAAC Protocol in Jam City, Bushehr Province in 2014. *Iranian South Medical Journal* 2017, 19(6):972-981.

42. Mohammadzadeh I, Ghafari J, BARARI SKR, Tamadoni A, ESMAEILI DM, Alizadeh NR: The prevalence of asthma, allergic rhinitis and eczema in north of Iran: The international study of asthma and allergies in childhood (ISAAC). 2008.

43. Farajzadeh S, Esfandiarpour I, Sedaghatmanesh M, Saviz M: Epidemiology and clinical features of atopic dermatitis in Kerman, a desert area of Iran. *Annals of dermatology* 2014, 26(1):26-34.

44. Ahmadi E, Rahnama Z, Tehrani A: Atopic Dermatitis and Type 1 Diabetes Mellitus in Iranian Children". *American Journal of Immunology* 2009, 5(3):98-100.
45. Nabavi M, Sherafati V: Prevalence of atopic eczema in infants under two years referring to the vaccination ward of the Hazrat Rasoul Akram Hospital, Tehran, Iran. *Journal of Kerman University of Medical Sciences* 2014, 21(6):498-507.
46. Noorbala M, Kafaie P: Pattern of skin diseases in the Central Iran, Yazd Province. *Journal of Pakistan Association of Dermatologists* 2010, 20(3):137-141.
47. Ghaini M, Jamee M, Mahdavian SA, Mesdaghi M, Eskandarzadeh S, Rae W, Eslami N, Eslamian G, Mansouri M, Babaei D: The prevalence of atopic manifestations in 313 Iranian patients with inborn errors of immunity. *International Archives of Allergy and Immunology* 2021, 182(11):1122-1126.
48. Golshan M, Mohammad-Zadeh Z, Khanlar-Pour A: Prevalence of asthma and related symptoms in junior high school children in Isfahan, Iran. *Monaldi archives for chest disease* 2002, 57(1):19-24.
49. Shabestari MS, Sahebi L: Prevalence of Asthma, Rhinitis Allergic and Eczema among Middle School Students in Tabriz (Northwestern of Iran). *Pediatric Research* 2011, 70(5):555-555.
50. Tolide-ie HR, Rastgoie Chavoshlu S, Rezve S, Modoodi Yaghooti M, Rahimi J: DO rural and urban children have different prevalence of allergic disorders in Gonabad? *Internal Medicine Today* 2012, 18(2):21-26.
51. Gharagosloo M, Khalili S, Karimi B, Honartnand M, Jafari H, Gh MS: Asthma, allergic rhinitis and atopic eczema in schoolchildren Kashan (1998-1999). *Tehran University Medical Journal TUMS Publications* 2003, 61(1):24-30.
52. Karimi Mehran MM, Ahmadiye Mohammad Hossein. Prevalence of symptoms of asthma, allergic rhinitis and eczema in 13-14-year-old children in Yazd schools in 2082. *Jundi Shapour Scientific Medical Journal (Internet)*. 1386; 6(3 (series 54)):270-275. Available from: <https://sid.ir/paper/12594/fa>.
53. Ravnborg N, Ambikaibalan D, Agnihotri G, Price S, Rastogi S, Patel KR, Singam V, Andersen Y, Halling A-S, Silverberg JI: Prevalence of asthma in patients with atopic dermatitis: A systematic review and meta-analysis. *Journal of the American Academy of Dermatology* 2021, 84(2):471-478.
54. Xie Q-W, Dai X, Tang X, Chan CH, Chan CL: Risk of mental disorders in children and adolescents with atopic dermatitis: a systematic review and meta-analysis. *Frontiers in Psychology* 2019, 10:1773.
55. Andersson AM, Kaiser H, Skov L, Koch A, Thyssen Jacob P: Prevalence and risk factors for atopic dermatitis in Greenlandic children. *Clinical and Experimental Dermatology* 2022.
56. Johansson E, Bergström A, Kull I, Melén E, Jonsson M, Lundin S, Wahlgren CF, Ballardini N: Prevalence and characteristics of atopic dermatitis among young adult females and males—report from the Swedish population-based study BAMSE. *Journal of the European Academy of Dermatology and Venereology* 2022, 36(5):698-704.
57. Ha J, Lee SW, Yon DK: Ten-year trends and prevalence of asthma, allergic rhinitis, and atopic dermatitis among the Korean population, 2008-2017. *Clin Exp Pediatr* 2020, 63(7):278-283.
58. Bylund S, von Kobyletzki LB, Svalstedt M, Svensson Å: Prevalence and incidence of atopic dermatitis: a systematic review. *Acta dermato-venereologica* 2020, 100(12):320-329.

59. Abuabara K, Yu A, Okhovat JP, Allen I, Langan SM: The prevalence of atopic dermatitis beyond childhood: a systematic review and meta-analysis of longitudinal studies. *Allergy* 2018, 73(3):696-704.
60. Larese Filon F, Pesce M, Paulo MS, Loney T, Modenese A, John SM, Kezic S, Macan J. Incidence of occupational contact dermatitis in healthcare workers: a systematic review. *Journal of the European Academy of Dermatology and Venereology*. 2021 Jun; 35(6):1285-9.
61. Kim JP, Chao LX, Simpson EL, Silverberg JI. Persistence of atopic dermatitis (AD): a systematic review and meta-analysis. *Journal of the American Academy of Dermatology*. 2016 Oct 1; 75(4):681-7.
62. Yousaf M, Ayasse M, Ahmed A, Gwillim EC, Janmohamed SR, Yousaf A, Patel KR, Thyssen JP, Silverberg JI. Association between atopic dermatitis and hypertension: a systematic review and meta-analysis. *British Journal of Dermatology*. 2022 Feb 1; 186(2):227-35.