



## The prevalence of Eczema in Iranian children: A systematic review and meta-analysis

Javad Ghaffari<sup>1</sup>

Mohammad Reza Navaeifar<sup>2</sup>

Reza Alizadeh-Navaei<sup>3\*</sup>

<sup>1,3</sup>Molecular and Cell Biology Research Center, Mazandaran University of Medical Sciences, Sari, Iran

<sup>2</sup>Antimicrobial Resistant Nosocomial Infection Research Center, Mazandaran University of Medical Sciences, Sari, Iran

### ARTICLE INFO

#### Article type:

Systematic Review, Meta-analysis

#### Article history:

Received: 3 August 2013

Revised: 21 October 2013

Accepted: 15 November 2013

**Key words:** Prevalence, Eczema, Children, Allergy, Iran

<http://jpr.mazums.ac.ir>

### ABSTRACT

Eczema is a very common disorder that affects children. To find out the national prevalence of eczema in Iranian children, we conducted a systematic review and meta-analysis by using the Google Scholar, PubMed in Medline area, AltaVista, IranMedex and Magiran in August 2013. The search terms included: Prevalence, Eczema, Children, Pediatric, Allergy, ISAAC and Iran. From 156 related articles based on criteria, all the studies performed on children by the International Study of Asthma and Allergies in Childhood protocol that contained eczema manifestations were selected. The required informations from each study included the authors name, date, city, size of population, prevalence of eczema and number of children in elementary school age groups (6-7 years) and junior high school (13-14 years). The information was recorded in designed tables. The extracted data were analyzed by STATA 11.

In this study, we analyzed 16 studies including 56,424 children in whom 28, 113 were in 6-7 years age group and 28, 311 in 13-14 years age group. The pooled prevalence of eczema in children aged 6-7 years and 13-14 years was 5.98% and 6.52%, respectively.

This review revealed the prevalence of eczema in Iranian children. This information can be helpful to identify and control eczema symptoms in children suffering from allergic disorders.

### Introduction

Atopic dermatitis (AD) is an increasingly chronic dermatologic disease. AD induces high costs to the health services due to heavy burden

for public health system.<sup>1</sup> Although, the prevalence of AD varies among different countries, according to ISAAC studies, AD can

\*Corresponding Author: Reza Alizadeh-Navaei MD, Candidate of PhD By research,

Mailing Address: Molecular and Cell Biology Research Center, Mazandaran University of Medical Sciences, Sari, Iran

Tel: +98 151 3543614

Fax: +98 151 3543614

Email: reza.nava@gmail.com

develop in all age group children around the world.<sup>2</sup> In addition, especially the prevalence of AD has increased in developing countries. The influencing factors on changing the prevalence of the disease, geographic differences and secular trends are unknown. But there is a relationship between the industrial, metropolitan and urban lifestyle in increasing the prevalence of AD.<sup>3,4</sup>

## Material and Methods

This is a systematic review and meta-analysis on the prevalence of eczema in Iranian children by ISAAC protocol in Iran. We conducted a literature review by using the Google Scholar, PubMed in Medline area, AltaVista, IranMedex and Magiran in August 2013. The search terms included: Prevalence, Eczema, Children, Pediatric, Allergy, ISAAC and Iran. All the studies performed on children by the International Study of Asthma and Allergies in Childhood protocol that contained eczema manifestations were selected.

All original studies conducted on children were included. The required information from each study included the authors name, date, city, size of population, prevalence of eczema and number of children in age groups 6-7 (Elementary school) and 13-14 (Junior school) according to ISAAC protocol and the prevalence of eczema in Iranian children. By the mentioned above criteria, we gathered 156 articles. The information was recorded in designed tables. Two independent authors checked all the studies. The evaluation was done first on the title and abstracts for selection of the studies.

The data extraction was performed on full text articles. The information was recorded on particularly designed sheets. The data were analyzed by STATA 11 and Funnel diagrams were used for publication bias and output table were extracted.

## Results

Finally, we reviewed 16 studies. Four studies were performed in both age groups according to ISAAC protocol and 9 in two separated age groups; elementary school or junior high school age groups. From a total of 56,424 children, 28,113 children were in elementary school age group and 28,311 children in junior high school age group.

Table 1 shows the list of the articles evaluated and the summary of the repossessed data.

The prevalence of eczema in children in both age groups was 17.6%. The lowest prevalence of eczema in Elementary school age group was 1.53% among males and 1.7% of females in Shiraz, and the highest prevalence of eczema in this age group was 11.8% in both genders in Zanjan. In junior school age group, the lowest prevalence of eczema was reported 6.4% among males in Ahvaz and the highest prevalence of eczema was 24.6% in females reported from Urmia.

The pooled prevalence of eczema in both age groups using fixed effect was shown in Tables 1 and 2.

Table 2 shows that the pooled prevalence of eczema in children in elementary school age was 5.98%. In this age group, the lowest prevalence of eczema was 1.62% in Shiraz and the highest was 11.8% in Rasht.

Table 3 shows that the pooled prevalence of eczema in children in junior high school age was 6.52%. In this age group, the lowest prevalence of eczema was 4.1% in Tabriz and the highest was 24.3% in Urmia. Publication bias was observed using Funnel diagrams.

## Discussion

According to this meta-analysis, the pooled prevalence of eczema in elementary school children (6-7 years old) and junior high school

**Table 1.** The list of evaluated papers and the summary of the reprocessed data (continued...)

Authors (Center)	Study design	Date	Size	Prevalence of Eczema				
				Elementary school No. (%)	Male	Female	Junior school No. (%)	
			Male	Female	Male	Female	Male	Female
Abolfazl Mohammadbeigi (Shiraz) <sup>5</sup>	ISAAC	2009-2010	3000	-	-	408(27.2%)	-	141(9.4%)
Iraj Mohammadzadeh (Sari) <sup>6</sup>	ISAAC	2002-2003	6000	37 (2.6%)	39 (2.4%)	149 (10.8%)	-	43 (2.8%)
Hadi Bazzazi (Gorgan) <sup>7</sup>	ISAAC	2003	2800	-	-	1316(19.8%)	-	1484(18.3%)
Javad Ghaffari (Sari) <sup>8</sup>	ISAAC	2010	1818	85(4.6%)	61(3.35%)	-	-	-
Mehran Karimi (Yazd) <sup>9</sup>	ISAAC	2002-2003	2740	95(6.4%)	103(8.3%)	-	-	-
Mohammad Gharagozlou (Kashan) <sup>10</sup>	ISAAC	1998	3000	-	-	243(8.1%)	-	330(11%)
Mohammad Gharagozlou (Kashan) <sup>11</sup>	ISAAC	1998-1999	3000	249(8.3%)	153(5.1%)	-	-	-
Seyed Mohammad Taghi Ayatollahi ( Shiraz) <sup>12</sup>	ISAAC	2002-2003	2228	1.53%	1.7%	-	-	-
MH Rahimi Rad(Urmia) <sup>13</sup>	ISAAC	2007	3000	-	-	360(24%)	-	369(24.6%)
Gisou Hatami (Boushehr) <sup>14</sup>	ISAAC	2002	2699 Male:1479 Female:1220	-	-	-	-	7.9% as a whole
Leyla Sahebi (Tabriz) <sup>15</sup>	ISAAC	2009	1508	-	-	-	-	110(7.3%) as a whole

**Table 1.** The list of evaluated papers and the summary of the reprocessed data (continued...)

Authors (Center)	Study design	Date	Size	Prevalence of Eczema			
				Elementary school No. (%)	Female	Male	Junior school No. (%)
Mohammad-Reza Masjedi (Zanjan) <sup>16</sup>	ISAAC	1996	5582 [2805(13-14y/o) +2777(6-7y/o)]	310(11.2%) as a whole		423(15.1%) as a whole	
Mohammad-Reza Masjedi (Zanjan) <sup>17</sup>	ISAAC	1996	5502 [2829(13-14y/o) +2693(6-7y/o)]	143(5.3%)		319(11.3%)	
Katayoon Najafizadeh (Zanjan) <sup>18</sup>	ISAAC	1996	6074 [3065(6-7y/o) +3009(13-4y/o)]	11.4% as a whole		14.9% as a whole	
Mohammed-Reza Masjedi (Rasht) <sup>19</sup>	ISAAC	2012	6061 [3057(6-7y/o) +3004(13-4y/o)]	361(11.8%)		526(17.5%)	
Abdulhossein Shakurnia(Ahvaz) <sup>20</sup>	ISAAC	-2006 2007	2930 [1473(6-7y/o) +1457(13-4y/o)]	24(4.1%)	33(4.1%)	43(6.4%)	63(7.8%)
<b>Total</b>			<b>56424</b>			<b>9909 (17.6%)</b>	

**Table 2.** The separate and pooled prevalence of eczema in Elementary school age Iranian children

Study	ES	[95% Conf. Interval]	% Weight
Mohammad-Reza Masjedi	11.200	-5.4e+03 5454.020	8.81
Mohammad-Reza Masjedi	5.300	-5.3e+03 5283.483	9.37
Katayoon Najafizadeh	11.400	-5.6e+03 5650.216	8.21
Mohammad Gharagozlou	6.700	-5.9e+03 5886.592	7.55
Iraj Mohammadzadeh	2.500	-5.9e+03 5882.392	7.55
Mehran Karimi	7.350	-5.4e+03 5377.651	9.05
Seyed Mohammad Taghi	1.620	-4.4e+03 4368.420	13.69
Abdulhossein Shakurnia	4.100	-5.7e+03 5746.794	7.92
Javad Ghaffari	3.900	-3.6e+03 3567.115	20.56
Mohammed-Reza Masjedi	11.800	-6.0e+03 6003.410	7.27
<b>I-V pooled ES</b>	<b>5.987</b>	<b>-1.6e+03 1621.825</b>	<b>100.00</b>

Heterogeneity chi-squared =0.00 (d.f. =9) p=1.000; I-squared ( variation in ES attributable to heterogeneity) = 0.0%;Test of ES=0 : z=0.01 p=0.994

**Table 3.** The separate and pooled prevalence of eczema in Junior school age Iranian children

Study	ES	[95% Conf. Interval]	% Weight
Mohammad-Reza Masjedi	15.100	-5.5e+03 5512.799	2.44
Mohammad-Reza Masjedi	11.300	-5.5e+03 5556.038	2.40
Katayoon Najafizadeh	14.900	-5.6e+03 5653.716	2.32
Mohammad Gharagozlou	9.550	-5.9e+03 5889.442	2.14
Gisou Hatami	7.900	-5.3e+03 5297.843	2.64
HadiBazzazi	19.000	-5.5e+03 5506.899	2.45
Iraj Mohammadzadeh	6.800	-5.9e+03 5886.692	2.14
Abdulhossein Shakurnia	7.100	-5.7e+03 5749.794	2.24
MH Rahimi Rad	24.300	-5.9e+03 5904.192	2.14
Leyla Sahebi	4.100	-989.602 997.802	74.82
Abolfazl Mohammadbei	18.300	-5.9e+03 5898.192	2.14
Mohammed-Reza Masjedi	17.500	-5.9e+03 5905.232	2.13
<b>I-V pooled ES</b>	<b>17.500</b>	<b>-853.002 866.043</b>	<b>100.00</b>

Heterogeneity chi-squared =0.00 (d.f.=11); p=1.000; I-squared (variation in ES attributable to heterogeneity) =0.0%;Test of ES=0 : z=0.01 p= 0.988

children (13-14 years old) based on ISAAC study was 5.99% and 6.52% respectively.

The result shows that in spite of higher prevalence of eczema among the junior high school children, the difference was not significant between the two groups. The prevalence of eczema among the junior school children is 6.52% that is higher compare with previous study that was reported 2.6%.<sup>7</sup>

Although, there are several etiologic factors that can influence on the different prevalence of the two studies groups, increasing the prevalence of allergic diseases such as eczema during the recent years can be one of the etiologic factor. Comparing with the mean prevalence of eczema around the world reported between 0.1-19.9 %, the prevalence of eczema is lower in Iran.<sup>21, 22</sup>

The prevalence difference of the disease can be multifactorial because exact etiology was not known and are varied among the different countries even in different parts a country related to environmental and ethnic varieties.<sup>22,23</sup> Some environmental factors influencing on prevalence of eczema are included: air pollution, contact with aeroallergens and food allergens. Metropolitan/urban life style is another cause of higher prevalence of eczema among people who live in urban area,<sup>24</sup> all of our studies were also performed in urban area. According to this meta-analysis, the pooled prevalence of eczema in Iranian elementary school children is higher than the prevalence of asthma among this population in Iran (5.99 Vs. 3.9% and 2.7% and 3.5%),<sup>5,25</sup> but it was lower compared with the prevalence of allergic rhinitis among elementary school children and junior high school children in our country (11.9% and 21.2% respectively).<sup>26</sup> The prevalence of eczema in our country is lower compared with the regional countries such as Kuwait and Oman (11.3% and 14.4% among junior high school children respectively), and 7.4% in elementary school children from Oman.<sup>27,28</sup> In

another investigation in 1996, the prevalence of atopic eczema among elementary school children (6-7 years old) was at least in Iran (1.1%) compared with the same age group children in England and Sweden that were reported 27.8% and 18.4% respectively.<sup>21,29</sup>

But the prevalence of eczema among 13-14 years old children in Albania and Nigeria was reported 0.8% and 17.75% respectively.<sup>21, 30</sup>

Based on this report and the results of this paper, currently, the prevalence of eczema has been increased in Iran. Similarly, Taylor et al. in England reported that the prevalence of eczema among 6-7 years old children in England have been increased in the last decades and the prevalence of allergy such as eczema was at the highest level in commonwealth countries of England.<sup>31,32</sup> For example, the prevalence of eczema in Australia is 32.2%.<sup>33</sup> In Brazil, similar to Iran, the prevalence of eczema is 6.6% among 6-7 years old children and 4.4% in 13-14 years old children.<sup>30</sup> As a whole, the prevalence of eczema in the United States is 10.7% that was higher than that was reported in our country.<sup>24</sup>

In another ISAAC study, the prevalence of eczema in the Pacific, Africa, North of America, Western European was reported 11.5%, 10.9%, 9.1% and 8.8% respectively. The results showed that the prevalence of eczema in Finland and England was higher than 15%, but 4.3% in Asia.<sup>34</sup> Our study showed that the prevalence of eczema in Iran is as high as the Asian countries and lower than European countries, North America and Mexico that is equal to 7.3%. The prevalence of eczema among other Asian countries like Taiwan, South Korea, China, Singapore, Turkish, Kuwait and Japan is 4%, 9.3%, 3%, 12.5%, 6.5%, 10.6% and 13.6% respectively and Iran is placed in a region with lower prevalence of eczema among other Asian countries.<sup>33</sup> There are different statistical data about the influence of gender on prevalence of eczema. Several studies

demonstrated that eczema is more common in girls.<sup>35,36</sup> But other studies reported that eczema like asthma is about 1.5% more common among male patients.<sup>35</sup> The results of our study also reveal that eczema is more prevalent among boys than girls, so the prevalence of eczema among elementary school children was 4.58% in boys and 4.15% in girls. The mean prevalence of eczema in children aged 13-14 years old was 16.05% in boys and 12.31% in girls. According to the results, the prevalence of eczema was higher among boys in both age groups.

### Conclusion

This meta-analysis study showed that in spite of the increasing prevalence of eczema in our country during the last decades, the prevalence of eczema in Iran is still lower than other Asian and non-Asian countries.

### Conflict of Interest

None declared.

### Funding/Support

None declared.

### References

1. Ellis CN, Drake LA, Prendergast MM, Abramovits W, Boguniewicz M, Daniel CR, et al. Cost of atopic dermatitis and eczema in the United States. *Journal of the American Academy of Dermatology* 2002; 46(3): 361-70.
2. Asher MI, Montefort S, Björkstén B, Lai CK, Strachan DP, Weiland SK, et al. Worldwide time trends in the prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and eczema in childhood: ISAAC Phases One and Three repeat multi country cross-sectional surveys. *The Lancet* 2006; 368(9537): 733-43.
3. Mercer M, Joubert G, Ehrlich R, Nelson H, Poyser M, Puterman A, et al. Socioeconomic status and prevalence of allergic rhinitis and atopic eczema symptoms in young adolescents. *Pediatric allergy and immunology* 2004; 15(3): 234-41.
4. Yobo EA, Custovic A, Taggart S, Asafo-Agyei A, Woodcock A. Exercise induced bronchospasm in Ghana: differences in prevalence between urban and rural schoolchildren. *Thorax* 1997; 52(2):161-5.
5. Mohammadbeigi A, Hassanzadeh J, Mousavizadeh A. Prevalence of asthma in elementary school age children in Iran- a systematic review and meta analysis study. *Pak J Biol Sci* 2011; 14(19): 887-93.
6. Mohammadzadeh I, Ghafari J, Barari Savadkoohi R, Tamaddoni A, Esmaili Dooki MR, Alizadeh Navaei R. The Prevalence of Asthma, Allergic Rhinitis and Eczema in North of Iran. *Iranian Journal of Pediatrics* 2008; 18 (2): 117-122.
7. Bazzazi H, Gharagozlou M, Kassaiee M, Afshin Parsikia, Zahmatkesh H. The prevalence of asthma and allergic disorders among school children in Gorgan. *Journal of research in medical sciences* 2007; 12(1): 28-33.
8. Ghaffari J, Mohammadzadeh J, Khalilian AR, Rafatpanah H, Mohammadjafari H, Davoudi A. Prevalence of asthma, allergic rhinitis and eczema in elementary schools in Sari (Iran). *Caspian J Intern Med* 2012; 3(1): 372-376.
9. Karimi M, Mirzaei M, Ahmadi MH. Prevalence of Asthma, Allergic Rhinitis and Eczema Symptoms among 13-14 Year-old School Children in Yazd in 2003. *Scientific Medical Journal of Ahwaz University of Medical Sciences* 2007; 6: 270-5.
10. Gharagozlou M, Khalili S, HallajMofrad HR, Mohammadzadeh R, Karimi B, Honarmand M, et al. Prevalence of symptoms of asthma, allergic rhinitis and atopic eczema in school children of Kashan (an ISAAC study). *Daneshvar Medicine* 2003; 11(47): 49-56. [In Persian]
11. Gharagouzlou M, Khalili S, Hallaj-Mofrad M, Karimi B, Honarmand M, Jafari M, et al. Asthma, Allergic Rhinitis and Atopic Eczema in School Children Kashan (1998-1999). *Tehran Univ Med J* 2003; 61(1): 24-30.[In Persian]
12. Ayatollahi SMT, Haleh G. Asthma and its correlates in primary school children in Shiraz. *J Med faculty Guilan Univ Med Sci* 2006; 15(57): 70-75.
13. Rad MH, Hamzezhadeh A. Allergic disease in 6--7-year-old schoolchildren in Urmia, Islamic Republic of Iran. *East Mediterr Health J* 2008;14(5):1044-53.
14. Hatami G, Amir Azodi E, Najafi A, Razavi SH, Afrasiabi K, Afarid M, et al. Prevalence of Asthma and Asthma-related symptoms among 13-14 yr. School children in Bushehr, ISSAC. *Iranian South Med J* 2003; 2003:2.
15. Sahebi L, Sadeghi Shabestary M. The prevalence of asthma, allergic rhinitis, and eczema among middle

- school students in Tabriz (northwestern Iran). *Turk J Med Sci* 2011; 41(5): 927-938.
16. Masjedi MR. ISAAC Phase Three Data, Zanjan, Iran.[online]. [cited 2012 December 10]. Available from:<http://isaac.auckland>.
  17. Masjedi MR. ISAAC Phase Three Data, Zanjan, Iran. [online]. [cited 2012 December 10]. Available from:<http://isaac.auckland>.
  18. Katayoon Najafizadeh, Lida Fadaizadeh, Solmaz Salek. Prevalence and Severity of Asthmatic Symptoms in Rasht Students: A Report from ISAAC Study. *Tanaffos* 2008; 7(1): 40-46.
  19. Masjedi MR. ISAAC Phase One Data, Rasht, Iran. [online]. [cited 2012 December 10]. Available from:<http://isaac.auckland.ac.nz/phases/phaseone/results/results.php>
  20. Shakurnia AH, Assar S, Afra M, Latifi M. Prevalence of asthma among schoolchildren in Ahvaz, Islamic Republic of Iran. *East Mediterr Health J* 2010; 16(6):651-6.
  21. Williams H, Robertson C, Stewart A, Ait-Khaled N, Anabwani G, Anderson R, et al. Worldwide variations in the prevalence of symptoms of atopic eczema in the International Study of Asthma and Allergies in Childhood. *Journal of allergy and clinical immunology* 1999; 103(1): 125-38.
  22. Weiland S, Hüsing A, Strachan D, Rzehak P, Pearce N. Climate and the prevalence of symptoms of asthma, allergic rhinitis, and atopic eczema in children. *Occupational and environmental medicine* 2004; 61(7): 609-15.
  23. Asher M, Keil U, Anderson H, Beasley R, Crane J, Martinez F, et al. International Study of Asthma and Allergies in Childhood (ISAAC): rationale and methods. *European respiratory journal* 1995; 8(3): 483-91.
  24. Shaw TE, Currie GP, Koudelka CW, Simpson EL. Eczema prevalence in the United States: data from the 2003 National Survey of Children's Health. *Journal of Investigative Dermatology* 2010; 131(1): 67-73.
  25. Ghaffari J, Aarabi M. The prevalence of pediatric asthma in the Islamic Republic of Iran: A systematic review and meta-analysis. *J Pediatr Rev* 2013; 1(1): 2-11.
  26. Mohammadzadeh I, Barari-Savadkoohi R, Alizadeh-Navaei R. The prevalence of allergic rhinitis in Iranian children: A systematic review and descriptive meta-analysis. *J Pediatr Rev* 2013; 1(2): 19-24.
  27. Behbehani NA, Abal A, Syabbalo N, Azeem AA, Shareef E, Al-Momen J. Prevalence of asthma, allergic rhinitis, and eczema in 13-to 14-year-old children in Kuwait: an ISAAC study. *Annals of Allergy, Asthma & Immunology* 2000; 85(1): 58-63.
  28. Al-Riyami B, Al-Rawas OA, AL-Riyami AA, Jasim LG, Mohammed AJ. A relatively high prevalence and severity of asthma, allergic rhinitis and atopic eczema in schoolchildren in the Sultanate of Oman. *Respirology* 2003; 8(1): 69-76.
  29. Beasley R. Worldwide variation in prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and atopic eczema: ISAAC. *The Lancet* 1998; 351(9111): 1225-32.
  30. Camelo-Nunes IC, Wandalsen GF, Melo KC, Nasplitz CK, Solé D. Prevalence of atopic eczema and associated symptoms in school children. *Journal de pediatria* 2004; 80(1): 60-4.
  31. Taylor B WJ, Wadsworth M, Peckham C. Changes in the reported prevalence of childhood eczema since the 1939–1945 war. *Lancet* 1984; 2: 1255–7.
  32. Habbick BF, Pizzichini MM, Taylor B, Rennie D, Senthilselvan A, Sears M. Prevalence of asthma, rhinitis and eczema among children in 2 Canadian cities: the International Study of Asthma and Allergies in Childhood. *Canadian Medical Association Journal* 1999; 160(13): 1824-8.
  33. Deckers IA, McLean S, Linssen S, Mommers M, Van Schayck C, Sheikh A. Investigating International Time Trends in the Incidence and Prevalence of Atopic Eczema 1990–2010: A Systematic Review of Epidemiological Studies. *PloS one* 2012; 7(7): e39803.
  34. Sugiyama K, Sugiyama T, Toda M, Yukawa T, Makino S, Fukuda T. Prevalence of asthma, rhinitis and eczema among 13–14-year-old schoolchildren in Tochigi, Japan. *Allergology International* 2000; 49(3): 205-11.
  35. Robertson CF, Dalton MF, Peat JK, Haby MM, Bauman A, Kennedy JD, et al. Asthma and other atopic diseases in Australian children. *Med J Aust* 1998; 168(9): 434-8.
  36. Austin JB, Kaur B, Anderson HR, Burr M, Harkins LS, Strachan DP, et al. Hay fever, eczema, and wheeze: a nationwide UK study (ISAAC, international study of asthma and allergies in childhood). *Archives of disease in childhood* 1999; 81(3): 225-30.