



Published by DiscoverSys

# Effect of aspirin desensitization on nasal polyps recurrence and remission based on imaging studies in patients with triple symptoms of asthma, aspirin sensitivity, and nasal polyps and the impact of this method on their quality of life



Seyyed Mostafa Hashemi, Seyyed Mojtaba Abtahi, Parisa Damirchi\*

## ABSTRACT

**Introduction:** Chronic rhinosinusitis with recurrent nasal polyps, asthma, and allergy to non-steroidal anti-inflammatory drugs (aspirin-induced asthma) is a condition that can severely affect patients' quality of life. This study was conducted to determine the effect of aspirin desensitization on nasal polyps recurrence and remission in patients with triple symptoms of asthma, aspirin sensitivity, and nasal polyps.

**Materials and methods:** In this clinical trial, samples consisted of 50 patients with aspirin-induced asthma were selected by Morgan table and were randomly divided into two groups, one case group, and one control group. The control group received no treatment while the case group received aspirin desensitization protocol using an ascending dose of aspirin from 25 mg every three hours to 325mg under direct supervision. After 3 months, pulmonary examination and imaging test were performed again. The patient's quality of life was investigated before and after treatment using the questionnaire of quality of life (QoL) of polyposis patients.

**Results:** The quality of life in patients with rhinosinusitis (RDS) before and after aspirin desensitization was  $48.38 \pm 5.21$  and  $46.06 \pm 4.85$  respectively which was significantly improved (if this result is from another study, author and the year of the study should be written in the sentence, or if this result is from all sample, then it should also be stated in the sentence). In the case group, the quality of life was also improved, with an average score of before and after treatment was  $47.32 \pm 6.61$  and  $42.6 \pm 3.42$  respectively ( $p < 0.001$ ) (the p-value already stated that the result was significant). Meanwhile, the quality of life in the control group was not improved, with average before and after treatment score was  $49.44 \pm 2.79$  and  $49.52 \pm 3.23$  respectively ( $p = 0.9$ ) (the p-value already stated that the result was not significant).

**Conclusion:** Aspirin desensitization leads to improvement of life quality and reduction of rhinosinusitis symptoms in patients with aspirin-induced asthma.

**Keywords:** Aspirin-induced asthma, desensitization, Aspirin-related asthma

**Cite This Article:** Hashemi, S.M., Abtahi, S.M., Damirchi, P. 2018. Effect of aspirin desensitization on nasal polyps recurrence and remission based on imaging studies in patients with triple symptoms of asthma, aspirin sensitivity, and nasal polyps and the impact of this method on their quality of life. *Bali Medical Journal* 7(3): 612-616. DOI: [10.15562/bmj.v7i3.896](https://doi.org/10.15562/bmj.v7i3.896)

Department of Otolaryngology,  
School of Medicine, Isfahan  
University of Medical Science

## INTRODUCTION

Acetylsalicylic acid (aspirin) is one of the most widely used nonprescription drugs (or you can use the term "over the counter drugs") worldwide. Aspirin-related asthma was defined for the first time 84 years ago with the first attack of bronchospasm asthma, rhinosinusitis and nasal polyps<sup>1,2</sup> which is also known as aspirin-induced asthma. Patients with aspirin-induced asthma due to the recurrent nasal polyps and complications of rhinosinusitis may have several surgeries along with long-term treatment with various drugs. These patients were also experiencing frequent asthma flare (or exacerbation) that may affect their quality of life. However, aspirin is a major treatment for many inflammatory diseases such as rheumatoid arthritis, as well as heart problems and sometimes deemed necessary for patients even though they have an allergy to aspirin.

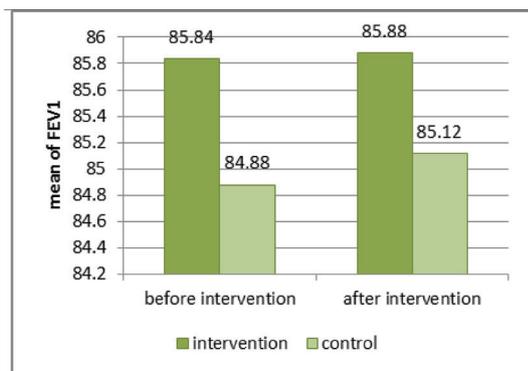
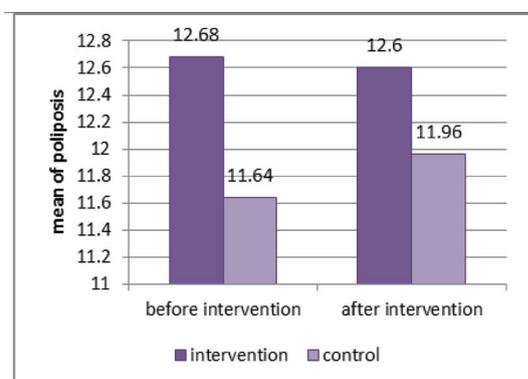
Chronic rhinosinusitis with recurrent nasal polyps, asthma, and allergy to NSAIDs is known as aspirin-induced asthma or asthma related to aspirin (AERD)<sup>3-5</sup> (asthma related to aspirin has been mentioned in the previous paragraph this sentence can be erased). Asthma symptoms in these patients are triggered within three hours after every dose of treatment<sup>6</sup> (is treatment in this sentence refer to aspirin? If so, it could be written as "every dose of aspirin"). AERD affected about 0.3- 2.5 % of the population,<sup>7-9</sup> beginning in the third decade of life and is more common in female.<sup>10,11</sup> Chronic sinusitis is one of the most common causes of referral to the hospital and reduction of quality of life<sup>11</sup> affected more than 30 million Americans<sup>12</sup> and provides over \$ 6 billion medical costs worldwide.<sup>13</sup> A strategy using NSAIDs can be done in these patients to induce aspirin tolerance condition

\*Correspondence to:  
Parisa Damirchi, Department of  
Otolaryngology, School of Medicine,  
Isfahan University of Medical Science  
[seyyedhashemi@gmail.com](mailto:seyyedhashemi@gmail.com)

Received: 2017-10-16  
Accepted: 2018-6-25  
Published: 2018-8-1

**Table 1** Mean ( $\pm$  SD) of rhinosinusitis symptoms of patients before and after treatment

| Variables                    | Intervention group |                 |       | Control group   |                 |        |
|------------------------------|--------------------|-----------------|-------|-----------------|-----------------|--------|
|                              | before             | after           | P     | before          | after           | P      |
| Nasal congestion             | 3.4 $\pm$ 0.76     | 3.16 $\pm$ 0.37 | 0.08  | 3.8 $\pm$ 0.65  | 3.4 $\pm$ 0.5   | 0.002  |
| Post nasal drip              | 3.28 $\pm$ 0.54    | 2.88 $\pm$ 0.33 | 0.02  | 3.44 $\pm$ 0.71 | 3.2 $\pm$ 0.41  | 0.34   |
| Discolored nasal             | 3 $\pm$ 4.08       | 2.84 $\pm$ 0.37 | 0.1   | 2.96 $\pm$ 0.35 | 2.88 $\pm$ 0.33 | 0.32   |
| Abnormal smell               | 3.4 $\pm$ 0.58     | 2.96 $\pm$ 0.2  | 0.02  | 3.36 $\pm$ 0.57 | 3.36 $\pm$ 0.64 | > 0.99 |
| facial pain and pressure     | 2.8 $\pm$ 0.58     | 2.76 $\pm$ 0.44 | 0.71  | 2.88 $\pm$ 0.53 | 3.08 $\pm$ 0.49 | 0.17   |
| Weather-related congestion   | 2.68 $\pm$ 0.69    | 2.52 $\pm$ 0.51 | 0.16  | 2.64 $\pm$ 0.49 | 2.44 $\pm$ 0.51 | 0.17   |
| Pain in teeth                | 3.12 $\pm$ 0.53    | 2.6 $\pm$ 0.5   | <0.01 | 2.64 $\pm$ 0.54 | 2.44 $\pm$ 0.51 | 0.32   |
| Watery nasal drainage        | 3.48 $\pm$ 0.65    | 2.8 $\pm$ 0.41  | <0.01 | 3.52 $\pm$ 0.51 | 3.32 $\pm$ 0.48 | 0.1    |
| Ear pain pressure            | 2.4 $\pm$ 0.58     | 2.12 $\pm$ 0.33 | 0.02  | 2.63 $\pm$ 0.49 | 2.71 $\pm$ 0.46 | 0.48   |
| Throat pain                  | 2.44 $\pm$ 0.65    | 2.12 $\pm$ 0.33 | 0.11  | 2.48 $\pm$ 0.51 | 2.65 $\pm$ 0.51 | 0.48   |
| Bad breath                   | 3.08 $\pm$ 0.64    | 3 $\pm$ 0.41    | 0.53  | 3.56 $\pm$ 0.51 | 3.56 $\pm$ 0.51 | < 0.01 |
| Coughing & wheezing          | 3 $\pm$ 0.76       | 3.08 $\pm$ 0.28 | 0.56  | 3.64 $\pm$ 0.49 | 3.68 $\pm$ 0.48 | < 0.01 |
| Snoring                      | 2.8 $\pm$ 0.82     | 2.56 $\pm$ 0.58 | 0.08  | 3.36 $\pm$ 0.67 | 3.24 $\pm$ 0.52 | 0.18   |
| Fatigue or general ill       | 3 $\pm$ 0.71       | 2.56 $\pm$ 0.51 | 0.02  | 2.92 $\pm$ 0.7  | 2.88 $\pm$ 0.53 | 0.74   |
| Irritability or mood changes | 2.44 $\pm$ 0.71    | 2.16 $\pm$ 0.37 | 0.52  | 2.48 $\pm$ 0.51 | 2.52 $\pm$ 0.51 | 0.71   |
| Problems at home or work     | 2.8 $\pm$ 0.65     | 2.72 $\pm$ 0.54 | 0.48  | 3.16 $\pm$ 0.55 | 3.2 $\pm$ 0.41  | 0.66   |

**Figure 1** Mean of FEV1 in the before and after treatment in the two groups (consider naming it as case group not intervention group)**Figure 2** Mean of polyposis in the before and after intervention

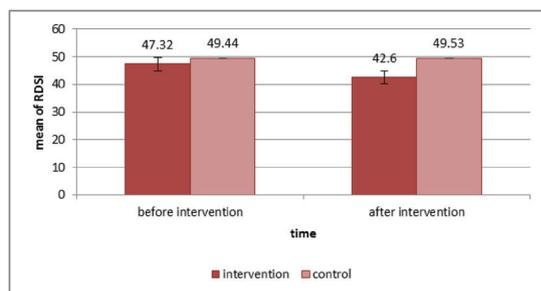
by aspirin desensitization protocol using various doses and methods. This method is important for some diseases such as degenerative joint disease, rheumatoid arthritis, headaches and cardiovascular disease.<sup>14</sup> Long-term use of aspirin after desensitization is associated with a significant reduction in the oral or nasal steroids usage, frequency of sinus infections, sinus surgery, and hospitalization, as well as improvement of smell.<sup>15</sup> In addition, this treatment may reduce the recurrence rate of nasal polyps.<sup>16,17</sup>

Chronic rhinosinusitis with recurrent nasal polyps, asthma, and allergy to non-steroidal anti-inflammatory drugs (aspirin-induced asthma) is a condition that can severely affect patients' quality of life. This study was conducted to determine the effect of aspirin desensitization on nasal polyps recurrence and remission in patients with triple symptoms of asthma, aspirin sensitivity, and nasal polyps.

## MATERIALS AND METHODS

This study was an experimental study which was performed in 2015-2016 in Al-Zahra and Ayatollah Kashani hospitals. The population in this study were patients with aspirin-induced asthma that their condition had proven by pulmonary examination and testing.

The samples consisted of 50 patients with aspirin-induced asthma. This samples were selected by Morgan table and were randomly divided into two



**Figure 3** Mean of quality of life in the before and after intervention

groups, case and control groups. The diagnosis of asthma in these patients was made by pulmonology subspecialty consultant, and aspirin sensitivity was diagnosed based on the patient's history.

The Inclusion criteria are patients with aspirin-induced asthma that has three conditions of asthma, aspirin sensitivity and nasal polyps, FEV1 more than 70%, cut antihistamines consumption 48 hours before the study, no history of gastrointestinal problems, kidney, liver and heart advanced problems, no history of anaphylaxis due to aspirin, no history of recent treatment with anticoagulants, no history of recent treatment with beta-blockers, the absence of pregnancy and the patient's agreement to participate in the study, as well as patients opt to continue participating in the study. Initiation of other treatments during the study period was considered as exclusion criteria. According to Berges-Gimeno et al. (2002) the sample size for this study was calculated using sample size formula by considering confidence level of 95%, statistical power of 80%, estimated prevalence of AERD in community which is equivalent 0.3,<sup>10</sup> and the minimum difference between the two groups which was equivalent to 0.15, therefore the sample size was 21 but to increase the reliability of this study, 25 patients in each group were examined.

After the approval of the proposals and obtaining authorization from the medical ethics committee, 50 patients with aspirin-induced asthma were admitted in the ear, nose and throat clinic and randomly divided into two groups, one case group and one control group (each group 25 patients).

A week before the start of chemotherapy, patients were asked to cut their consumption of antihistamines and use montelukast daily due to prevents the possible effect of antihistamines that could interfere aspirin desensitization symptoms.

Before treatment, the patients underwent spirometry and CT scan examination. The patient also filled a questionnaire. Desensitization protocol for both groups was same, and each group was asked to continue their previous treatments. The control group was treated with the placebo. The case

group was hospitalized for two or three days in the hospital under the direct supervision. Then, under close observation, the patients were given aspirin started from dose of 25 mg to 100 mg every three hours on the first day and 325 mg on the second day (25, 50, 100, 150, 200, 325). After patient tolerating this amount of aspirin in the absence of problems, they were discharged with the maintenance dose of 325 mg daily. For the control group, the same method was done using a placebo. If during the desensitization protocol naso-ocular symptoms present, intranasal oxymetazoline was used to treat the symptoms whereas respiratory symptoms occurred, racemic epinephrine and albuterol spray were used. After three months patients underwent another spirometry and CT Scan examination. Patients also filled the same questionnaire to examine the Quality of Life. The Statistical Package for Social Sciences (SPSS, version 20) was used to analyze the data. In order to examine the possible differences between the two groups in term of changes of polyposis size, an ANOVA and t-test were run to analyze the results in case and control groups.

## RESULTS

In this study, 50 patients with polyposis in two groups (each group 25 patients), one group undergoing desensitization of aspirin as case and other as control group, were studied. The mean age of patients in both case and control groups were  $34.52 \pm 9.2$  and  $34.92 \pm 9.04$  years respectively, and there was no significant difference between the two groups ( $p = 0.88$ ). In both groups, 9 patients (36%) were male, and 16 (64%) were female. Based on spirometry results, the mean of FEV1 before and after aspirin desensitization intervention in all patients was  $85.36 \pm 5.15$  and  $85.5 \pm 4.73\%$  respectively and this treatment method had no significant effect on improvement of FEV1.

On the other hand, no significant difference in FEV1 was seen in the case group before and after desensitization so that the index in the group was  $85.84 \pm 5.35$  and  $85.88 \pm 4.73$ , and based on the T-paired test; there was no significant difference in this index ( $p = 0.93$ ). The average of these indicators before and after treatment in the control group was  $84.88 \pm 5$  and  $85.12 \pm 4.15$ , and in this group, the differences were not significant ( $P = 0.61$ ). Mean difference of FEV1 in the case and control groups were  $-0.04 \pm 2.32$  and  $-0.24 \pm 2.31$  respectively and based on T-test, there was no significant difference between the two groups ( $p = 0.76$ ). According to the results of the CT scan, the polyposis mean size before and after treatment in all patients was  $12.16 \pm 2.9$  and  $12.28 \pm 2.73$  respectively and after

aspirin desensitization, a significant deterioration in polyposis size was not observed ( $P = 0.14$ ), but for polyposis regression, there was a significant difference between case and control groups. (repeated measures ANOVA in later sentence shows  $p = 0.11$  which means there was no significant difference between case and control groups, although there is slight difference in each ANOVA result of case and control group) Polyposis size before and after desensitization in the case group was  $12.68 \pm 3.08$  and  $12.6 \pm 2.98$  respectively and a significant difference in remission polyposis was not observed ( $P = 0.43$ ). However in the control group, the size of polyposis, after desensitization therapy significantly increased from an initial average of  $11.64 \pm 2.66$  to  $11.96 \pm 2.47$  and the difference was significant pre-post treatment ( $p = 0.08$ ). At the same time, repeated measures ANOVA showed changes of polyposis size in the case and control groups, had no significant difference ( $p = 0.11$ ). In [Figure 1](#) and [2](#), the mean of FEV1 and polyposis size before and after aspirin desensitization has been shown in two groups.

The quality of life in patients with rhinosinusitis (RDS) before and after aspirin desensitization (if this means quality of life in all patient, then it should be stated that patients in this statement refer to all 50 patients) was  $48.38 \pm 5.21$  and  $46.06 \pm 4.85$  respectively and post-treatment quality of life was significantly improved (decreased symptoms Sickness). In the case group, quality of life before and after treatment was  $47.32 \pm 6.61$  and  $42.6 \pm 3.55$  respectively and based on the T-paired test the difference was significant before and after intervention ( $p < 0.001$ ) (symptoms of the patients is shown in next paragraph. Therefore, this sentence should focus on showing the quality of life of the patients). The average quality of life in the control group before and after treatment was  $49.44 \pm 2.74$  and  $49.52 \pm 3.23$  respectively and the difference pre-post treatment in this group was not significant ( $p = 0.9$ ). Also based on the variance analysis with repeated observations changes of quality of life in both groups, there was a significant difference ( $p < 0.001$ ) and improvement of the quality of life in patients undergoing aspirin desensitization ([figure 3](#)).

In [Table 1](#), mean and standard deviation of rhinosinusitis (RDS) before and after treatment in each group is shown. According to Wilcoxon test, in the treated group, severe forms of smell, PND, dental pain and pressure, pressure in the ears, runny nose, sore throat, fatigue, and lethargy were significantly improved, while in the control group, only Eclipse nose, PND, difficulty in breathing and coughing and wheezing were improved.

## DISCUSSION

Sensitivity to aspirin can lead to anaphylaxis. These patients may also have other reaction regarding the usage of nonsteroidal anti-inflammatory drugs. The cause of the disease is unknown, but the disorder in the arachidonic acid cascade is considered as one of the factors that led to the production of leukotrienes. In this way, nonsteroidal anti-inflammatory drugs inhibit the production of prostaglandins hence cascade path is gone towards leukotriene production and creation of inflammatory reactions.<sup>18</sup> Aspirin desensitization has shown positive results in reducing the symptoms of asthma and requirement of medication. Leukotriene antagonists and inhibitors (Montelukast, Zafirlukast, etc.) also have been used in the treatment of this diseases and showed good results.<sup>18</sup> Patients with aspirin-induced asthma may often face polyposis recurrence and multiple surgeries. Since the aspirin desensitization therapy in patients with aspirin-induced asthma is acceptable treatment and on the other hand, in these patients, due to polyposis recurrence, repeated surgery is also required, this study was done with the aim to determine the effect of desensitization of aspirin on the rate of relapse and remission in patients with triple symptoms of nasal polyps, asthma, and aspirin sensitivity. Based on our results, desensitization of aspirin in patients with aspirin-induced asthma did not have significant effect on improving FEV1 and polyposis regression and also did not help to improve both of these indexes. However the increase of polyps size was lower in the case (consider using case group as stated in the method rather using intervention group) group, it can be hoped that with the continuation of treatment can reduce the progression of polyps size and delay recurrence after surgery. Based on the results, rhinosinusitis symptom severity was significantly reduced in patients who were treated with aspirin desensitization. Therefore aspirin desensitization seems to be more favorable for improving the quality of life (or you can also use "therefore aspirin desensitization can improve the quality of life of these patients). In a study by Christine et al., in 2014, desensitization of aspirin in patients with aspirin-induced asthma was led to significant improvements of quality of life of patients and reduction of rhinosinusitis symptoms.<sup>19</sup>

## CONCLUSION

Based on the results of this study, aspirin desensitization is able to enhance the quality of life and reduce symptoms of rhinosinusitis in patients with aspirin-induced asthma. This treatment is likely to

have a favorable impact on quality of life and can particularly decrease morbidity, hyposmia, PND, pain, and pressure in the teeth, rhinorrhea, the pressure in the ears, sore throat, fatigue, and lethargy and can also reduce the rate of progression of the disease. Therefore, aspirin desensitization is recommended in these patients.

## REFERENCES

1. Widal MF, Abrami P, Lemoyez J. Anaphylaxie et idiosyncrasie. *Presse Med* 1922;30:189–92.
2. Szczeklik A, Stevenson DD. Aspirin-induced asthma: advances in pathogenesis, diagnosis, and management. *J Allergy Clin Immunol* 2003;111:913–21
3. Katharine M. Woessner FA, Andrew A. White, James T. Evidence-based approach to aspirin desensitization in aspirin-exacerbated respiratory disease. *Journal of allergy and clinical immunology* vol 133, num 1, page 286. The full version of this article, including a review of relevant issues to be considered, can be found online at [www.jacionline.org](http://www.jacionline.org).
4. Gosepath J, Schafer D, Mann WJ. Aspirin sensitivity: long term follow-up after up to 3 years of adaptive desensitization using a maintenance dose of 100 mg of aspirin a day. *Laryngorhinootologie* 2002;81:732–738.
5. Stevenson DD. Aspirin sensitivity and desensitization for asthma and sinusitis. *Curr Allergy Asthma Rep* 2009;9:155–163.
6. Stevenson DD, Szczeklik A. Clinical and pathologic perspectives on aspirin sensitivity and asthma. *J Allergy Clin Immunol* 2006;118:773–786.
7. Szczeklik A, Gryglewski RJ, Czerniawska-Mysik G. Relationship of inhibition of prostaglandin biosynthesis by analgesics to asthma attacks in aspirin-sensitive patients. *BMJ* 1975;1(1): 67–9
8. C. Jenkins, J. Costello, and L. Hodge, “Systematic review of prevalence of aspirin induced asthma and its implications for clinical practice,” *British Medical Journal*, vol. 328, no. 7437, pp. 434–437, 2004.
9. D.D. Stevenson, M. Sanchez-Borges, and A. Szczeklik, “Classification of allergic and pseudoallergic reactions to drugs that inhibit cyclooxygenase enzymes,” *Annals of Allergy, Asthma and Immunology*, vol. 87, no. 3, pp. 177–180, 2001.
10. M. P. Berges-Gimeno, R. A. Simon, and D. D. Stevenson, “The natural history and clinical characteristics of aspirin exacerbated respiratory disease,” *Annals of Allergy, Asthma and Immunology*, vol. 89, no. 5, pp. 474–478, 2002.
11. Y. Chen, R. Dales, and M. Lin, “The epidemiology of chronic rhinosinusitis in Canadians,” *Laryngoscope*, vol. 113, no. 7, pp. 1199–1205, 2003.
12. M. S. Benninger, B. J. Ferguson, J. A. Hadley et al., “Adult chronic rhinosinusitis: definitions, diagnosis, epidemiology, and pathophysiology,” *Otolaryngology*, vol. 129, no. 3, pp. S1–S32, 2003.
13. Smith TL, S.Mendolia-Loffredo, T. A. Loehr, R. Sparapani, P. W. Laud, and A. B. Nattinger, “Predictive factors and outcomes in endoscopic sinus surgery for chronic rhinosinusitis,” *Laryngoscope*, vol. 115, no. 12, pp. 2199–2205, 2005.
14. Ray NE, J. N. Baraniuk, M. Thamer et al., “Healthcare expenditures for sinusitis in 1996: contributions of asthma, rhinitis, and other airway disorders,” *Journal of Allergy and Clinical Immunology*, vol. 103, no. 3, pp. 408–414, 1999.
15. Kowalski ML. Management of aspirin-sensitive rhinosinusitis-asthma syndrome: What role for aspirin desensitization? *Allergy Proc* 1992;13(5):175–84.
16. Stevenson DD, Zuraw BL, “Pathogenesis of aspirin exacerbated respiratory disease,” *Clinical Reviews in Allergy and Immunology*, vol. 24, no. 2, pp. 169–187, 2003
17. Aspirin Sensitivity and Chronic Rhinosinusitis with Polyps: A Fatal Combination Hendrik Graefe, Christina Roebke, Dirk Schaffer, and Jens Eduard Meyer. *Hindawi Publishing Corporation Journal of Allergy* Accepted 13 June 2012
18. Nucera E, Schiavino D, Milani A. Effects of lysine acetylsalicylate (LAS) treatment in nasal polyposis: two controlled long term prospective follow up studies,” *Thorax*, vol. 55, no. 2, supplement, pp. S75–S78, 2000.
19. Christine Ibrahim, Kulraj Singh, Gina Tsai, David Huang, Jorge Mazza, Brian Rotenberg, Harold Kim, David William Moot (2014). A retrospective study of the clinical benefit from acetylsalicylic acid desensitization in patients with nasal polyposis and asthma. *Allergy, Asthma & Clinical Immunology*. December 2014, 10:64



This work is licensed under a Creative Commons Attribution