

# Obesity is Associated with an Increased Prevalence of Penicillin Allergy

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## BACKGROUND

- Penicillin allergy is the most frequently reported drug allergy.
- Penicillin allergy labels are associated with the use of broader spectrum antibiotics and increased rates of anti-microbial resistant infections.
- Epidemiologic data has shown an increased risk of atopy and asthma in obesity<sup>1</sup>. Several studies have established that obesity contributes to asthma incidence in children<sup>2</sup> and adults<sup>3</sup>.
- There is conflicting evidence for the association between allergic rhinitis and obesity in children<sup>4</sup>.
- There are reports of increased penicillin allergy<sup>5</sup> and others which state that there is no increased risk of drug allergy in atopy<sup>6</sup>.
- There is a paucity of data to assess the relationship between obesity and drug allergy.

## RATIONALE

- The goal of this study is to establish the prevalence of penicillin allergy in obese inpatients and compare it to the prevalence in non-obese inpatients.
- The secondary goal of this study is to characterize the prevalence of atopic conditions in obese patients with a documented penicillin allergy.

## METHODS

- The 2012-2014 National Inpatient Sample database (NIS) was used to select patients with a diagnosis of obesity.
- The ICD 9 code V14.0 was used to determine subjects with a history of penicillin allergy. The following ICD 9 codes were used to identify atopic patients: asthma (ICD 493 and 493.9), allergic rhinitis (ICD 477.9), atopic dermatitis (ICD 691.8), and urticaria (ICD 708.0, 708.1, 708.8, and 708.9).
- The prevalence of penicillin allergy in the obese subset was compared to non-obese subjects in the database.
- The odds of allergic rhinitis, atopic dermatitis, asthma, and urticaria were compared among non-obese subjects with penicillin allergy and obese subjects with penicillin allergy.

## RESULTS

Table 1: Demographics of patients with penicillin allergy in obese and non-obese groups

Non-Obese (n=19,219,451)		Obese (n=2,268,842)	
Age		Age	
Mean (SD)	61.1 (20.7)	Mean (SD)	58.0 (16.0)
Median [IQR]	64 [47.0-78.0]	Median [IQR]	59 [48.0-70.0]
Gender- n (%)		Gender- n (%)	
Male	183391 (34.0)	Male	27480 (28.4)
Female	355515 (66.0)	Female	69426 (71.6)
Missing	44 (0.0)	Missing	2 (0.0)
Race- n (%)		Race- n (%)	
White	386880 (71.8)	White	66388 (68.6)
Black	64990 (12.1)	Black	15730 (16.2)
Hispanic	41301 (7.6)	Hispanic	7670 (7.9)
Asian/Pacific Islander	8038 (1.5)	Asian/Pacific Islander	627 (0.6)
Native American	2711 (0.5)	Native American	580 (0.6)
Other	13837 (2.6)	Other	2147 (2.2)
Missing	21193 (3.9)	Missing	3766 (3.9)

Table 2. Prevalence of penicillin allergy and associated atopic conditions in non-obese and obese groups

	Non-Obese n (%)	Obese n (%)	Odds ratio	95% Confidence Interval	P-value
Penicillin Allergy	538950 (2.8)	Penicillin Allergy 96908 (4.3)	1.55	(1.54-1.56)	<0.0001
Atopic Dermatitis	168 (0.01)	Atopic Dermatitis 38 (0.01)	1.26	(0.88-1.79)	0.2047
Asthma	1074 (0.2)	Asthma 316 (0.3)	1.64	(1.45-1.86)	<0.0001
Allergic Rhinitis	5938 (1.1)	Allergic Rhinitis 1498 (1.5)	1.41	(1.33-1.49)	<0.0001
Urticaria	741 (0.1)	Urticaria 182 (0.2)	1.37	(1.16-1.61)	0.0002

## DISCUSSION

- We found 4.3% of the obese patients had penicillin allergy as compared to 2.8% of the non-obese group, which is a statistically significant difference.
- These results may be the first to demonstrate obesity is associated with greater odds of having penicillin allergy and provides more support for a relationship between obesity and drug allergy.
- Obesity is also associated with increased odds of asthma, atopic dermatitis, allergic rhinitis, and urticaria, concordant with results from previous studies.
- The strength of this study is the large number of subjects which increases its power for statistical significance.
- The data is de-identified however; hence it is impossible to know if duplicate patient entries were made for subsequent hospitalizations.
- The diagnosis codes logged for each patient are at the discretion of the provider entering the information, thus there is no clear way to validate the accuracy of the discharge diagnoses.

## CONCLUSION

- Our study shows that obese patients have an increased prevalence and odds of penicillin allergy.
- Also, our findings demonstrate that obese patients with penicillin allergy have a higher prevalence of atopic comorbidities.

## REFERENCES

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