

Summary

Penicillin is the most common beta-lactam antibiotic allergy and remains the most common drug class allergy reported with a prevalence of 10% depending on specific population evaluated. Un-verified penicillin allergy is a significant and growing public health issue, and mislabeling of penicillin allergy increases the risk of frequent hospitalization, antibiotic-resistant infections and medical cost. These findings highlight the significance of confirmed diagnosis of beta-lactam antibiotic allergy.

The mechanisms involved in allergic reactions to penicillin can be antibody mediated reaction or T-cell dependent. Excessive production of interleukin-4(IL-4) and interferon-gamma (IFN- γ) is thought to be important in development of allergic disease and atopy.

This case-control study aims to evaluate the possible role of *IL-4R α Q576R* gene polymorphism in modulating allergic response against penicillin, in addition to study the effect of IL-4 and IFN- γ cytokines in regulating allergic reaction.

This study was conducted on 50 patients with history of penicillin allergy confirmed by skin test, (24males and 26 females) with age ranged between 8-62 years old recruited from out-patients' departments of Al-Diwaniaya Teaching Hospital during period from second of January of 2017 to the end of June of the 2017. Other 50 apparently healthy subjects who have no allergic reaction (13 males and 37 female) with age ranged between 18-65 years, they were included as control group, blood samples were collected from both groups.

Enzyme linked-immunosorbent assay (ELISA) technique was used to detect serum level of total IgE in patients and control, and to measure the

serum concentration of IL-4 and IFN- γ . Genomic DNA was extracted from blood for molecular assay to study the correlation between *IL-4RaQ576R* gene polymorphism and susceptibility to penicillin allergy. Genotyping done by using Polymerase Chain Reaction-Restriction Fragment Length Polymorphism (PCR-RFLP) technique.

This study revealed that 68% of penicillin allergic patients were in age group 30-49 years and followed by age group less than 20 years of age with prevalence of 12%. The result also showed that 52% of allergic patients were female, and 48% male. The data showed that 74% of the allergic patients were from urban area and 26% from rural area, also 24% of patients having chronic diseases while 76% of patients have no chronic diseases, also result revealed that 56% of allergic patients were with positive associated atopy versus only 8% with positive family history of penicillin allergy.

Immunological assay results of this study showed a significant higher level of IL-4, IFN- γ and total IgE in patient's serum (348.53 pg/ml, 194.33pg/ml and 357.28IU/ml respectively, $P=0.001$) compared with control (284.72pg/ml, 159.82pg/ml and 124.88IU/ml respectively,).

The current study detected that polymorphism in *IL-4Ra* gene is a genetic factor that favor BLs allergy and was significant among penicillin allergic patients. AA genotype appeared to be associated with BLs allergy (OR:2.08, 95%CI:0.93-4.62, EF:0.31), while GG genotype carried a significant protection and might be considered as a preventive effect against beta-lactam allergy with preventive fraction (PF:0.34), moreover it was found that genotype GA showed to be slightly associated with beta-lactam drug allergy with an effective fraction(EF=0.06), and A allele was associated with beta-lactam drug allergy with an effective fraction

(EF=0.16), while G allele carried a significant preventive action against beta-lactam allergy with a preventive fraction (PF=0.16).

