INTRODUCTION:

The medicinal sciences have always aimed at an increased effort to increase the patient safety & reduce medical errors. These errors are mainly caused due to therapeutic failure and adverse drug reactions which arise as a result of incorrect dosing of the routinely prescribed drugs. The drugs are metabolized by drug metabolizing enzymes of which the N-Acetyltransferase enzyme forms a major class. It is now being observed that with the descriptions of genetic polymorphism in the drug metabolizing enzymes, the field of pharmacogenetics may improve medical care through a reduction in adverse drug reactions oriented errors. The status of these drug metabolizing enzymes can be characterized using phenotyping studies which categorizes the population into poor, extensive or ultra-extensive metabolizers. Such a division of population based on their metabolic status will be of immense help to the medical authorities in deciding the drug dose.

Today science has gone beyond the orthodox concept treating disease or disorder in human being. In next 10 to 20 years the term known as personalized medicine become more popular than traditional therapeutic medicine practice. This development is happens due to more knowledge of genetic components of individuals combination with Pharmaceutical science. Hence, awareness of important characteristic of individual increase because of genomic science. Hence research of drugs and treatment going to more focus on single individual in future which is not far away.

Pharmacogenomics and Pharmacogenetics

As per the normal designation of the Pharmacogenomics explain as it is science to study knowledge of genomics and proteomics to recognize the new drug targets and mechanism of their action. Whereas the Pharmacogenetics explains as it is science of to study the inter-individual specific genetic variation correlated to drug response. When these two ways comes together then it help to pharmaceutical and health care related sectors by facilitated by drug development and personalized medicine for more drug safety and prevents its
adverse effects. But current scenario, the very few applications have shown successful outputs in clinical drug practices. [2][3]

**Personalized Medicine**

This term defines its self that every individual get medical treatment according his or her genetic make-up. The two areas that notably signify patient’s safety concern are therapeutic failure & adverse drug events (ADEs). [4] ADEs consist of both compliance issues & medical dispensing errors whereas Therapeutic failure refers to lack of efficacy because low quantity dose of medicine. Another main area as, adverse drug reactions (ADRs) are the side effects that occur even though appropriate administration of the correct medication at the ‘intended dose’. [5] The ADEs are caused when there is occurrence of overload drug in the body for longer duration of time. The drug result is typically based upon the genetic make-up of an individual which is expected to demonstrate inter-individual variation in ‘genetic polymorphism’ in population. Hence, the intended dose might not prove suitable for every individual. [6]

**Phenotype**

Phenotyping is one of the most general methods used to study genetic polymorphism to measure adverse drug effect. Phenotype is defined as the measurement of defined biochemical parameter or function. [7] It requires ingestion of a probe drug; the metabolism of which is known to be exclusively dependent on one of the acetylator enzymes such as N-acetyltranspherase. It most common used to determine the presence and activity of a particular metabolizing enzyme in tissue biopsy. Phenotyping can be straightforward and invasive and potentially dangerous. Thus Phenotyping study separates the population of subjects in three main different types according to their genetic polymorphism into poor, extensive or ultra extensive metabolizers so that it can be used in standardizing the drug level in treatment for each individual. [8][9][10]
**Acetylation Polymorphism**

In Pharmacogenetics the human Acetylation polymorphism is most important studied which motivate inter-individual and inter-ethnic differences in reply to xenobiotics. Genetic Polymorphism is defined as the inheritance of a trait controlled by a single genetic locus with two alleles, in which the least common allele has a frequency of about 1% or greater. [11][12] Genetically determined differences in N-Acetylation ability have proved to be important determinants of both the effectiveness of particular drug and the mode of adverse drug reactions and toxicity during medicinal treatment. [13][14] Furthermore, many association studies have linked the Acetylation phenotype to vulnerability to a variety of complex human diseases as regarding asthma, cancer and other allergic disorders. [15][16][17] There are two main genes are responsible for Acetylation Polymorphism as known as ‘Fast’ Acetylator and ‘Slow’ Acetylator. Here fast gene is dominant over slow gene. Each gene contains two alleles. Fast gene contains both fast alleles or one fast and other slow alleles whereas a slow gene contains both slow alleles. If individual contains fast gene then Acetylation polymorphism do not produce any adverse effect for drug. Slow gene creates complications in human due to poor metabolism in Acetylation polymorphism. [18]