e-ISSN: 2322-0139
p-ISSN: 2322-0120

Research and Reviews: Journal of Pharmacology and Toxicological Studies

A Survey on Adverse Drug Reactions

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Commentary

Received: 30-10-2015
Accepted: 04-11-2015
Published: 19-11-2015

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Keywords: Adverse drug reactions, Self-medication, Prescribed drugs, Bizzare effects, Chronic effects, Delayed effects

ABSTRACT

Antagonistic medication responses are otherwise called Adverse drug reactions. Unfriendly medications responses (Adrs), are harmful, unintended, also, undesirable effects which happen as consequence of medication treatment. These responses happen because of self-pharmaceutical or because of admission of over measurement of solutions without solution. The recommended medications may deliver undesirable impacts alongside principle impact which prompts unfriendly medication responses. A large portion of the unfavorable medication responses are preventable. Henceforth, with a specific end goal to dodge unfriendly medication responses one ought to take just legitimately endorsed medications.

Introduction

Adverse drug Reactions (ADR) is happened when blend of two then again more medications. At the point when damage influenced and taking a medication, it causes in single measurements or proceeded with dosage of a medication. It results to bring about the side impacts. Unfavorable medication responses in youngsters square measure an essential open awfulness. Drug specialists in sorted out health awareness frameworks need to create complete, in advancement programs for recognition furthermore, scope unfriendly medication responses. Antagonistic medication responses (ADRs) to unconstrained reporting frameworks and to explore whether there are contrasts between diverse sorts of ADRs[1-5].

An antagonistic response to a medication has been characterized as any unintended response to a medication that is managed in standard measurements by the privilege course for finding and treatment. Some medication responses could happen in everyone, though others happen exclusively in slanted patients. A medication hypersensitive response is partner degree immunologically intervene response that displays specificity and profit for re-presentation to the hostile drug [6-8].

Classification of Adverse drug reactions:

Type A: Augmented pharmacologic effects:

Greatest it is the dosage subordinate and unsurprising, related to pharmacological activity of medication. Augmentations of the foremost pharmacological activity of the medication are the lethal responses connected to overabundance measurements or weakened discharge, or to both. These are three sorts: Unsurprising, Common, Dose-subordinate. Unsurprising is moderately effortlessly anticipated by preclinical and clinical pharmacological studies [14-16].Safety signal initiative by WHO regarding Pharmacovigilance has developed as a system [13,14]. Patient Safety have evolved at rate in all the

Countries on the primary focus of drug safety in clinical perspectives [15,16], the trends, scope ,future initiatives, Modern developing technologies have wide scope for the enhancement of Pharmacovigilance career [17-21].

Type B: Bizarre effects:

It is measurement autonomous and unusual and Drug Narrow mindedness, Lower limit to typical pharmacological activity of a drug, Undesirable pharmacological impact at suggested measurements and single normal measurement of headache medicine. Invulnerable interceded reaction to a medication specialists in sharpened patient eg: Hypersensitivity with penicillin. Eccentric medication responses are exceptional reaction to medication [17-20].

Type C: Chronic Reactions:

It is natural attributes can be excused from synthetic structure and connected with long haul drug treatment. It is surely understood and can be expected [21-23].

Type D: Delayed Reactions:

It is natural attributes can be excused from synthetic structure and connected with long haul drug treatment. It is surely understood and can be expected [24].

Side Effects:

Reality and seriousness:

Adverse medication responses cause Death, Lifethreatening, Hospitalization, Disability - noteworthy, industrious, or perpetual change, hindrance, harm or disturbance in the tolerant's body capacity/structure, physical exercises or personal satisfaction. Requires intercession to forestall changeless debilitation or harm [25-30].
Almost unavoidable auxiliary medication impact created by restorative measurements force is measurement subordinate. Happen instantly after at first taking medication or may not show up until weeks after start of medication utilization Auxiliary pharmacological impact, improvement of loose bowels with anti-infection treatment because of adjusted GIT bacterial greenery, orthostatic hypotension with a phenothiazine[31-33].

Drug Interactions:

At the point when two medications taken together and they influence one another's reaction pharmacologically or dynamically. Activity of a medication on the adequacy or harmfulness of another medication. A medication communication is a circumstance in which a substance influences the movement of a medication when both are directed together. This activity can be synergistic or hostile or another impact can be delivered that neither delivers all alone. Normally, collaborations between medications ring a bell [34-36]. Notwithstanding, communications might likewise exist in the middle of medications and sustenance's (drug-nourishment associations), and also medications and therapeutic plants or herbs. Individuals taking upper medications, for example, monoamine oxidase inhibitors ought not take sustenance containing tyramine as hypertensive emergency may happen (an illustration of a medication nourishment connection) [37,38]. These connections may happen out of unintentional abuse or because of absence of learning about the dynamic fixings included in the important substances.
It is along these lines simple to see the significance of these pharmacological cooperations in the act of medication [39,40]. On the off chance that a patient is taking two medications and one of them expands the impact of the other it is conceivable that an overdose may happen. The cooperation of the two medications might likewise build the danger that symptoms will happen. Then again, if the activity of a medication is decreased it may stop to have any restorative utilization in light of under dose. Despite the above, once in a while these communications may be looked for with a specific end goal to get an

enhanced restorative effect [41-44]. Examples of this incorporate the utilization of codeine with paracetamol to expand its pain relieving impact. Then again the mix of clavulanic corrosive with amoxicillin, keeping in minds the end goal to overcome bacterial imperviousness to the anti-infection. It ought to likewise be recollected that there are connections that, from a hypothetical angle, may happen however in clinical practice have no essential repercussions [45-48].
The pharmaceutical associations that are of extraordinary enthusiasm to the act of medication are fundamentally those that have negative impacts for a creature [49,50]. The danger is that a pharmacological collaboration will seem increments as a component of the quantity of medications regulated to a patient in the meantime.

It is conceivable that a communication will happen between a medication and another substance exhibit in the organic entity (i.e. sustenances or liquor) [51,52]. Then again in certain particular circumstances a medication may even respond with itself, for example, happens with drying out. In different circumstances, the collaboration does not include any impact on the medication. In specific cases, the vicinity of a medication in a singular's blood may influence certain sorts of lab investigation (scientific impedance) [53].

It is additionally workable for cooperations to happen outside an organic entity before organization of the medications has occurred. This can happen when two medications are blended, for instance, in a saline arrangement preceding intravenous infusion. Some excellent samples of this kind of collaboration incorporate that Thiopentone and Suxamethonium ought not be set in the same syringe and same is valid for Benzylpenicillin and Heparin [54,55]. These circumstances will all be talked about under the same making a beeline for their applied similitude.

Drug collaborations may be the consequence of different procedures. These procedures may incorporate modifications in the pharmacokinetics of the medication, for example, changes in the ingestion, dissemination, digestion system, and discharge (ADME) of a medication. Then again, medicate associations may be the aftereffect of the pharmacodynamic properties of the medication, e.g. the co-organization of a receptor rival and an agonist for the same receptor [56-58].

Synergy and antagonism:

At the point when the cooperation causes an increment in the impacts of one or both of the medications the communication is known as a synergistic impact. An "added substance cooperative energy" happens when the last impact is equivalent to the aggregate of the impacts of the two medications (Although a few creators contend that this is not genuine collaboration). At the point when the last impact is much more noteworthy than the whole of the two impacts this is called improved collaboration. This idea is perceived by the larger part of authors [59], albeit different creators just allude to cooperative energy when there is an improved impact. These creators utilize the expression "added substance impact" for added substance collaboration and they save utilization of the expression "synergistic impact" for upgraded synergy [60]. The inverse impact to cooperative energy is termed enmity. Two medications are adversarial when their communication causes a reduction in the impacts of one or both of the medications. Any investigation of pharmacological cooperations between specific drugs ought to additionally talk about the feasible collaborations of some therapeutic plants. The impacts brought on by therapeutic plants ought to be considered in the same route as those of prescriptions as their collaboration with the creature offers ascend to a pharmacological reaction. Different medications can change this reaction furthermore the plants can offer ascent to changes in the impacts of other dynamic fixings.

Pharmacokinetic interactions:
Changes in the impact of a medication are created by contrasts in the retention, transport, dissemination, metabolization or discharge of one or both of the medications contrasted and the normal conduct of every medication when taken independently [61]. These progressions are fundamentally changes in the amassing of the medications. In this regard two medications can be homergic on the off chance that they have the same impact in the organic entity and heterergic if their belongings are diverse.

e-ISSN: 2322-0139
p-ISSN: 2322-0120

Transport and distribution interactions:

The primary collaboration instrument is rivalry for plasma protein transport. In these cases the medication that arrives first ties with the plasma protein, leaving the other medication disintegrated in the plasma, which alters its fixation [62]. The creature has systems to check these circumstances (by, for instance, expanding plasma leeway), which implies that they are not more often than not clinically important. In any case, these circumstances ought to be considered if there other related issues are available, for example, when the technique for discharge is influenced.

Metabolism interactions:

Numerous medication collaborations are because of modifications in medication metabolism [17] Further, human medication metabolizing chemicals are regularly actuated through the engagement of atomic receptors [63]. One prominent framework included in metabolic medication connections is the protein framework involving the cytochrome P450 oxidases.

Renal excretion:

Just the free part of a medication that is broken up in the blood plasma can be uprooted through the kidney. Subsequently medicates that are firmly bound to proteins are not accessible for renal discharge, the length of they are not metabolized when they may be killed as metabolites [64]. Creatinine leeway is utilized as a measure of kidney working however it is just valuable in situations where the medication is discharged in an unaltered frame in the pee. The discharge of medications from the kidney's nephrons has the same properties as that of whatever other natural solute: uninvolved filtration, reabsorption and dynamic emission. In the recent stage the discharge of medications is a dynamic process that is liable to conditions identifying with the saturability of the moved atom and rivalry between substrates. Thusly these are key locales where cooperations between medications could happen. Filtration relies on upon various elements including the pH of the pee, it having been demonstrated that the medications that go about as feeble bases are progressively discharged as the pH of the pee turns out to be more acidic, and the backwards is valid for powerless acids. This component is of incredible utilization when treating inebriations (by making the pee more acidic or more soluble base) and it is likewise utilized by a few medications and home grown items to create their intuitive impact.

Bile excretion:

Bile discharge is not quite the same as kidney discharge as it is dependably includes vitality use in dynamic transport over the epithelium of the bile pipe against a fixation slope. This vehicle framework can likewise be soaked if the plasma centralizations of the medication are high. Bile discharge of medications for the most part happens where their atomic weight is more prominent than 300 and they contain both polar and lipophilic gatherings. The glucuronidation of the medication in the kidney likewise encourages bile discharge. Substances with comparative physicochemical properties can obstruct the receptor, which is critical in evaluating connections. A medication discharged in the bile conduit can sometimes be reabsorbed by the entrails (in the entero-hepatic circuit), which can likewise prompt associations with different medications.

Epidemiology:

Among US grown-ups more established than 55, 4% are taking medicine as well as supplements that put them at danger of a noteworthy medication interaction [26]. Potential medication drug connections have expanded over time [27] and are more normal in the low taught elderly even in the wake of controlling for age, sex, spot of habitation, and comorbidity.

REFERENCES

1. Jhansi K. Review on Adverse Drug Reactions. Adv Pharmacoepidem Drug Safety. 2015; 4: 05-R.
2. Soussi Tanani D, Serragui S, et al. Signal Management of Disproportionate Reporting in Moroccan Pharmacovigilance: The Lower Limb Edema Induced by Anti-Tuberculosis Drugs. J Pharmacovigilance. 2015; 3: 161.
3. Vallano A, Castañeda PF, et al. Hospital Doctors' Views and Concerns about Pharmacovigilance. J Pharmacovigilance. 2015; 3: 160.
4. Fredy IC, Palatty PL, et al. Cardiovascular Medicine Safety Profile Evaluation among Urban Private Hospitals. Adv Pharmacoepidemiol Drug Saf. 2015; 4: 175.
5. Garlapati S and Anireddy KR. Itâ€™s All about Signals, Risk Management and How Important These Are? Adv Pharmacoepidemiol Drug Saf. 2014; 3: e127.
6. Yerramilli A, Veerla S, et al. A Pharmacovigilance Study Using Tracer Techniques. Adv Pharmacoepidemiol Drug Saf. 2014; 3: 165.
7. Devi S. Use of Informatics in Identification of Adverse Drug Reactions. J Bioequiv Availab. 2014; 6: e54.
8. Elkalmi RM, Al-Iela OQ, et al. Motivations and Obstacles for Adverse Drug Reactions Reporting among Healthcare Professionals from the Perspective of Lewinâ€™s Force Field Analysis Theory: Analytic Approach. J Pharmacovigilance. 2014; 2: 130.
9. Srba J. The Missing Voice of Non-Serious Adverse Drug Reactions from Marketing Authorisation Holders. Adv Pharmacoepidemiol Drug Saf. 2014; 3:154.
10. Kharkar M, Bowalekar S. Extent of Under Reporting of Adverse Drug Reactions (ADRs) in India: Evaluation using Logistic Regression Analysis (LRA) Model. J Clin Trials. 2014; 4: 155.
11. Zimmermann A. Reporting Adverse Drug Reactions in Poland â€“. The Legal Situation. J Pharmacovigilance. 2014; 2: e117.
12. Srba J and Vlcek J. Position and Processing of Adverse Drug Reactions Directly Submitted by Patients to National Regulatory Authorities in Europe. J Pharmacovigilance. 2014; 2: 122.
13. Radhakrishnan Rajesh, Sudha Vidyasagar, et al. Evaluating the Impact of Educational Interventions on Use of Highly Active Antiretroviral Therapy and Adherence Behavior in Indian Human Immunodeficiency Virus Positive Patients: Prospective Randomized Controlled Study. J AIDS Clin Res. 2013; 4:231.
14. Al-Hazmi N and Naylor IL. Attitude and Awareness of Adverse Drug Reaction Reporting by Health Professionals in Seven Hospitals in the Holy City of Makkah, Kingdom of Saudi Arabia. J Clin Trials. 2013; 3: 139.
15. Nahar R and Verma IC. Genetic Bleeding Risk Score (GBRS) for Patients on Oral Anticoagulant Therapy. Int J Genomic Med. 2013; 1:101.
16. Prasad A, Datta PP, et al. Pattern of Adverse Drug Reactions Due to Cancer Chemotherapy in a Tertiary Care Teaching Hospital in Eastern India. J Pharmacovigilance. 2013; 1: 107.
17. Al-Hazmi NN and Naylor IL. A Study of Community Pharmacistsâ€™ Awareness and Contributions to Adverse Drug Reactions (ADRs) Reporting Systems in the Makkah, Kingdom of Saudi Arabia (KSA). J Clin Trials. 2013; 3:127.
18. Chen XW, Liu W, et al. Pharmacogenomics-Guided Approaches to Avoiding Adverse Drug Reactions. Clinic Pharmacol Biopharm. 2012; 1: 104.
19. Rishi RK, Patel RK. Under Reporting of ADRs by Medical Practitioners in India - Results of Pilot Study. Adv Pharmacoepidem Drug Safety. 2012; 1: 112.
20. Yano S, Kobayashi K, et al. Adjunctive Corticosteroid to Counteract Adverse Drug Reactions from First-Line Antituberculous Drugs. Mycobac Dis. 2012; 2: 113. doi: 10.4172/2161-1068.1000113
21. Aagaard L, Meyer U, et al. Pharmaceutical Production Problems Detected by Adverse Drug Reactions Reports: A Documentary Study from the German Democratic Republic, 1982 to 1990. J Clinic Toxicol. 2012; 2:120.
22. Obiako OR, Muktar HM, et al. Adverse Reactions Associated with Antiretroviral Regimens in Adult Patients of a University Teaching Hospital HIV Program in Zaria, Northern Nigeria: An Observational Cohort Study. J Antivir Antiretrovir. 2012; 4: 006-013. doi:10.4172/ jaa.1000039
23. Quintas LEM, Gram KRS, et al. Pharmacokinetic Modifications and Drug-Drug Interactions in Clinical Monitoring of the Elderly: A Short Review. Pharm Anal Acta. 2011; 2: 141.

24. Rahanandeh H, Khodakaramian G, et al. Characteristics and Antagonistic Potential of Pseudomonas spp. against Pratylenchus loosi. J Plant Pathol Microb. 2012; 3: 140.
25. Joshi M, Srivastava R, et al. Screening of Resistant Varieties and Antagonistic Fusarium oxysporum for Biocontrol of Fusarium Wilt of Chilli. J Plant Pathol Microb. 2012; 3: 134.
26. Venkata Ratna Ravi Kumar D, Murali Yugandhar N, et al. Screening of Antagonistic Marine Actinomycetes: Optimization of Process Parameters for the Production of Novel Antibiotic by Amycolatopsis Alba var. nov. DVR D4. J Microbial Biochem Technol. 2011; 3: 092-098.
27. Tateishi A, Cauchi M, et al. Discerning Data Analysis Methods to Clarify Agonistic/Antagonistic Actions on the Ion Flux Assay of Ligand-Gated Ionotropic Glutamate Receptor on Engineered Post-Synapse Model Cells. J Biosens Bioelectron. 2011; 2: 104.
28. Chang E and He L. Antagonistic Effects of Insulin Signaling and Glucagon Signaling on Controlling Hepatic Gluconeogenic Gene Expression. Pediat Therapeut. 2014; 4: 200.
29. Donio MBS, Velmurugan S, et al. Antagonistic Bacillus cereus TC-1 Isolated from Solar Salt Work in Southern India. J Microb Biochem Technol. 2014; 6: 242-246.
30. Kadiri SK, Yarla NS, et al. Screening and Isolation of Antagonistic Actinobacteria Associated With Marine Sponges from Indian Coast. J Microb Biochem Technol. 2014; S8: 003.
31. Cha R, Michienzi SM, et al. Antimicrobial Pharmacokinetics and Pharmacodynamics in the Treatment of Nosocomial Gram-negative Infections. Adv Pharmacoepidem Drug Safety. 2012; S1: 005.
32. Parthasarathi D, Gajendra C, et al. Analysis of Pharmacokinetic & Pharmacodynamic Models in Oral and Transdermal Dosage Forms. J Bioequiv Availab. 2011; 3: 268-276.
33. Qiang G, Yang M, et al. (2011) Pharmacokinetic and Pharmacodynamic Study of Terazosin in Healthy Chinese Volunteers: Significant Hysteresis Phenomenon. J Bioequiv Availab. 2011; 3: 228-232.
34. Cook CS, Valaitis PW, et al. Differences in Relative Bioavailability (BA) of Inhalation Insulin Determined using Insulin and Glucose Levels Following Subcutaneous and Inhalation Administration in Humans. J Bioequiv Availab. 2011; 3: 198-201.
35. Zollner R, Junior EA, et al. Bioequivalency Study for Inhaled Drugs: A Pharmacodynamic Approach. J Bioequiv Availab. 2011; 1: 004.
36. Bragatto MS, dos Santos MB, et al. Comparison between Pharmacokinetic and Pharmacodynamic of Single-Doses of Furosemide 40 mg Tablets. J Bioequiv Availab. 2011; 3: 191-197.
37. Yan L, Xie A, et al. Pharmacokinetics of Cycloserine in Rats by HPLC-MS/MS. Med chem. 2015; 5: 104-107.
38. Stephen B Duffull, et al. An Inductive Approximation to the Solution of Systems of Nonlinear Ordinary Differential Equations in Pharmacokinetics-Pharmacodynamics. J Theor Comput Sci. 2015; 1: 119.
39. Papanastasopoulos P. Functional Imaging in Cancer Drug Development: A Mini-Review. J Med Diagn Meth. 2014; 3: 157.
40. Tams C, Johnson K. Prediction Variability of Combined Pharmacokinetic Pharmacodynamic Models: A Simulation Study of Propofol in Combination with Remifentanil and Fentanyl. J Anesth Clin Res. 2014; 5: 393.
41. Samala S, Veeresham C. Enhanced Bioavailability of Glimepiride in the Presence of Boswellic Acids in Streptozotocin-Induced Diabetic Rat Model. Nat Prod Chem Res. 2013; 1: 116
42. Ortolani E, Landi F, et al. Nutritional Status and Drug Therapy in Older Adults. J Gerontol Geriat Res. 2013; 2: 123.
43. Connors KP, Kuti JL, et al. Optimizing Antibiotic Pharmacodynamics for Clinical Practice. Pharmaceut Anal Acta. 2013; 4: 214.
44. Slaughter RL. Welcome to the Special Edition of Recent Advances in Pharmacokinetics and Pharmacodynamics. Adv Pharmacoepidem Drug Safety. 2013; S1: 008.
45. Cadwell JJS. The Hollow Fiber Infection Model for Antimicrobial Pharmacodynamics and Pharmacokinetics. Adv Pharmacoepidem Drug Safety. 2012; S1: 007.
46. Alice Nichols I, Jessica Behrle A, et al. Pharmacokinetics, Pharmacodynamics, and Safety of Desvenlafaxine, a Serotonin-Norepinephrine Reuptake Inhibitor. J Bioequiv Availab. 2013; 5: 022-030.

47. Piccinno A, Poli G, et al. Extrafine Beclometasone Dipropionate and Formoterol in Single and Separate Inhalers. Clinic Pharmacol Biopharm. 2012; 1: 102.
48. Paul K, Nathan LC, et al. Global Proteomics: Pharmacodynamic Decision Making via Geometric Interpretations of Proteomic Analyses. J Proteomics Bioinform. 2008; 1: 315-328.
49. Moreno RA, Sverdloff CE, et al. Comparative bioavailability and pharmacodynamic aspects of cyclobenzaprine and caffeine in healthy subjects and the effect on drowsiness intensity. J Bioequiv Availab. 2009; 1: 086-092.
50. Sunkara G, Yeh C, et al. Assessment of Ethnic Differences in the Pharmacokinetics and Pharmacodynamics of Valsartan. J Bioequiv Availab. 2010; 2: 120-124.
51. Jitendra Kumar Singh, Anant Solanki, et al. Rapid Equilibrium Dialysis (RED): an In-vitro High-Throughput Screening Technique for Plasma Protein Binding using Human and Rat Plasma. JBB/Volume. 2012; S14: 005
52. Hind AA Elagib, ElBagir M, et al. Effect of Natural Spices on Plasma Proteins in Broiler Chicks. J Nutr Food Sci. 2012; 2: 152.
53. Deepika Arora, Zafar Mahmood, et al. Plasma Protein Profiling of Breast Cancer Patients of North Indian Population: A Potential Approach to Early Detection. J Proteomics Bioinform. 2013; 6. 5 088-098.
54. Longo JPF, Muehlmann LA. No Nanoparticle is an Island - the Dynamic Interaction between Nanoparticles and Plasma Proteins. Chemotherapy. 2013; 2: 123.
55. Calogiuri GF, Di Leo E, et al. Chlorhexidine Hypersensitivity: A Critical and Updated Review. J Allergy Ther. 2013; 4:141.
56. Gomes R, Ribeiro F, et al. Desensitization to Allopurinol in Localized and Systemic Hypersensitivity Reactions. J Allergy Ther. 2013; 4: 138.
57. Shreya S, Ramesh K, et al. Comparative Evaluation of Hydroxyapatite, Potassium Nitrate and Sodium Monofluorophosphate as in Office Desensitising Agentsâ€“A Double Blinded Randomized Controlled Clinical Trial. Oral Hyg Health. 2013; 1: 104.
58. Nemaura T, Dhoro M, et al. Evaluation of the Prevalence, Progression and Severity of Common Adverse Reactions (Lipodystrophy, CNS, Peripheral Neuropathy, and Hypersensitivity Reactions) Associated with Anti-Retroviral Therapy (ART) and Anti-Tuberculosis Treatment in Outpatients in Zimbabwe. J AIDS Clin Res. 2013; 4: 203.
59. Gothwal SK, Khosya S, et al. Dapsone Hypersensitivity Syndrome- A Fatal Adverse Drug Reaction. Intern Med. 2013; 3: 123.
60. Hegazi AG, Abdel-Rahman EH, et al. Influence of Honey on Immune Status in Mice-Bearing Ehrlich Carcinoma. J Clin Cell Immunol. 2015; 6: 295.
61. Mohassel LR, Whitman A, et al. Successful Treatment with Panitumumab and Irinotecan in a Colorectal Cancer Patient with a Severe Hypersensitivity Reaction to Cetuximab. J Clin Case Rep. 2013; 4: 469.
62. Deshpande S. Investigation of Tooth Wear and its Associated Etiologies in Adult Patients Visiting Dental Institute in India. Dentistry. 2015; 5: 271.
63. Park M, Boys EL, et al. Hypersensitivity Pneumonitis Caused by House Cricket, Acheta domesticus. J Clin Cell Immunol. 2014; 5: 248.
64. Bourton EC, et al. Hypersensitivity of BRCA1 Heterozygote Lymphoblastoid Cells to Gamma Radiation and PARP Inhibitors. J Genet Syndr Gene Ther. 2013; 4: 146.