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Review Article

Co-Administration of Alcohol and Medication- Resulting Effects

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ABSTRACT

Alcohol when taken along with any medication results in unwanted effects. These effects completely depend on the duration of alcohol intake i.e., acute or chronic alcohol intake. The drug interaction with alcohol is of two types, pharmacodynamic interaction and pharmacokinetic interaction. Pharmacodynamic interaction includes either synergistic effect or antagonistic effect with respectto drug action. Pharmacokinetic interaction includes interference in drug absorption, distribution, metabolism andexcretion. In the case of acute alcoholic intake, it interferes with the drug absorption by inhibiting its metabolism and leading to drug toxicity. In the case of chronic alcoholics, there is increased metabolism of the drug thus decreases the drug bioavailability and therapeutic failure. Drugs that are used to treat CNS-related disorders such as sedatives, anti-epileptics, anti-convulsants, psychotropic drugs when administered along with alcohol it shows synergistic sedative action. Alcohols are generally metabolised in the liver, when intake of alcohol is chronic it leads to liver cirrhosis. Drugs with the side effects of hepatotoxicity administered along with alcohol there is increased hepatotoxicity. Some drugs inhibit the metabolism of alcohol by inhibiting the enzyme aldehyde dehydrogenase enzyme. For example, disulfiram inhibits the aldehyde dehydrogenase enzyme thus there is no conversion of acetaldehyde to acetic acid and thus increased accumulation of acetaldehyde that results in flushing. In the renal system alcohol inhibits the release of antidiuretic hormone (ADH) thus most of the drug is excreted through the renal pathway. Hence drug and alcohol co administration should be avoided.

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Introduction

Alcohol is mostly consumed orally in the form of beverages that contains ethanol (Castellsagué *et al.*, 2004). Many drugs are having interactions with alcohol and produce an undesired effect. Sometimes these effects may be mild but most of them are severe (Schuckit & Hesselbrock, 2004). Patients when

taking OTC medication to get symptomatic relief for his /her health condition and intake of ethanol after taking medicine leads to disturbances in the drug action and drug absorption (Weathermon & Crabb, 1999). In some cases, activity is increased in other's antagonism is seen (Liguori & Robinson, 2001). In few cases there is decreased metabolism of the drug (Linnoila*et al.,* 1979) leading to toxicity of the drug and in others there is increased metabolism (Hu *et al.,* 2005) of the drug resulting in decreased bioavailability of the drug and therapeutic failure (Mallet*et al.*, 2007). The reported drug interactions with alcohol were illustrated in table1.

Table 1: Drug interactions with alcohol

DRUG	INTERACTION WITH ALCOHOL
Prazosin, Terazosin and Doxazosin(Abuse & Alcoholism, 2007; Ahas *et al.,* 2010)	Dizziness and fall in blood pressure
Apraclonidine and Brimonidine(Detry-Morel, 2006)	CNS related toxicity
Propranolol, Pindolol, Sotalol, Timolol, Metaprolol, Atenolol, Acebutol, Bisoprolol, Esmolol, Labetolol, Carvidolol and Nebivolol(Cohen*et al.,* 2016; López*et al.,* 2004; Tighe*et al.,* 2010)	Light Headedness, Dizziness And Additive Effect In Lowering Blood Pressure And Pulse Rate Unsteady
Tolbutamide, Chlorpropamide, Glibenclamide, Glipizide, Gliclazide, Glimepiride, Repaglinide, Nateglinide, Rosiglitazone, Pioglitazone Acarbose and Miglitol(Krentz, 2012; Stettler*et al.*,2016; Taheri*et al.,* 2015)	Hypoglycaemia in acute alcoholics, hyperglycemia in chronic alcoholics and disulfuram like action with chlorpropamide
Metformin(Balch*et al.*,2012; LaValle, 2015)	Lactoacidsis, Dyspnia andSlow Heart Rate
Flavoxate and Chlophedianol(Aronson, 2014; McDonagh & Santa, 2005)	Impairment of judgment
Doxycycline(Dangi*et al.,* 2021; Held & Fried, 1977)	Increased elimination of Doxycyclin in chronic alcoholics
Erythromycin(Edelbroek*et al.,* 1993)	Delayed absorption of Erythromycin
Isoniazid(Goldman & Braman, 1972)	Isoniazid induced hepatotoxicity, thinking and psychomotor skills depression (CNS depression)
Atropine, Propanthalineclidinium, Tolterodine, Dicyclomine and Glycopyrolate(Goriacko & Veltri, 2019; Pappano, 1998)	Impairment of attention and additive depressant effects
Amphetamine, Methamphetamine, Dexamphitamine and Fenfluramine(Fischbach, 2017; Vearrier*et al.*, 2012; Vivero*et al.,* 1998)	Increased heart rate and chest pain
Phenylpropanolamine(Cox & Rampes, 2003)	Cardio vascular adverse effects and dizziness
Ifosfamide(Diener & Kastrup, 2003)	Additive CNS effects like drowsiness, dizziness, seizures, confusion and extrapyramidal symptoms.
Methotrexate(Ramachandran & Kakar, 2009)	Hepatotoxicity, acute hepatitis, chronic fibrosis, Necrosis, cirrhosis and elevated liver enzymes

Epirubicin(Huang *et al.,* 2020)	Hepatotoxicity
Trabectidin(Vincenzi *et al.,* 2016)	Acute Hepatotoxicity
Brentuximab(Ricart, 2017)	Liver Injury
Metronidazole and Tinidazole(Andersson, 1981; Lau*et al.,* 1992)	Di-sulfuran like effect
Phenobaibitone and Primidone(Brick, 2009; Lieber, 2001)	Additive CNS depressant, actions including impaired coordination, sedation and death
Diazepam, Clonazepam and Lorazepam(Griffin *et al.,* 2013; Sproule *et al.,* 1997)	Potentiate CNS effect of Benzodiazepam (Cyp450 inhibition)
Phenytoin, Mephenytoin and Ethotoin(Minck *et al.,* 1991; Patsalos & Perucca, 2003)	Increase plasma Phenytoin level
Valproic Acid, Sodium Valproate Carbamazepine, Oxcarbamazepine, Ethosuximide and Phensuximide(Shorvon, 2004)	Additive CNS depression and impairment of judgement, thinking and psychomotor skills
Imipramine, Desipramine, Trimipramine, Doxepine, Amoxapine, Amitriptyline, Nortriptyline and Protriptyline(Basco & Rush, 2005)	Additive impairment of motor skills (especially driving skills)
Aspirin, Diclofenac, Indomethacin, Tolmetin, Sulnidac, Etodolac, Piroxicam, Meloxicam, Ibuprofen, Ketoprofen, Fenoprofen, Flurbiprofen, Naproxen, Oxaprozin, Mefenamic Acid and Meclofenamate (Russo *et al.,* 2016)	Gastro intestinal bleeding
Paracetamol (Prescott, 2000).	Induces microsomal enzyme and causes hepatotoxicity by metabolites
Metyrosine (Nasrallah *et al.,* 1977)	Excessive somnolence
Reserpine, Deserpidine and Guanadrel (Rabbani, 2010)	Generalized and orthostatic hypotension

Conclusion

The above study revealed that alcohol drink when taken along with some medication results in unwanted effectsdepend on the quantity of alcohol intake. It was found that alcohol has both pharmacodynamics and pharmacokinetic interactions. As alcohol is get metabolized in the liver that leads to liver cirrhosis. Drugs that causehepatotoxicity,diminishes liver function, that interim reduced alcohol metabolism leads to accumulation of alcohol in the blood. So, drugs and ethanol should not be co administered for the safety of the patient.

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Conflict of Interest

The authors declare that there are no conflicts of interests.

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