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Prevalence of Alcohol-Interactive Medications and Conditions With Concurrent Alcohol Use in Older Adults

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Abstract

Many prescription medications can either directly or indirectly interact with alcohol and many chronic conditions may be worsened by alcohol use. Medications, such as antihypertensives, anticoagulants, and gastrointestinal agents, can be dangerous when taken with alcohol and can lead to loss of consciousness, falls, serious bleeding and other issues. Chronic conditions, such as gastroesophageal reflux disease, hypertension and cirrhosis can directly be worsened with alcohol consumption. These potential complications are pertinent to all ages, but there is greater concern of these interactions in older adults, defined as adults over 65 years old. Using survey data from older adults in Lexington, KY, descriptive statistics were used to analyze the prevalence of alcohol-interactive medications and alcohol-interactive disease states with concurrent alcohol use in this population.

The aim of this study was to investigate older adults in Kentucky using medications that that interact with alcohol or have disease states that can be worsened or caused by alcohol. These findings could help determine if there is a gap in care regarding this issue. If a gap in care is identified, then possible interventions to make, such as re-structuring pharmacist alcohol screening to include these interactions, will be investigated and a need for further research will be determined.

Executive Summary

The primary objective of this study was to identify the prevalence of alcohol-interactive medications and alcohol-interactive conditions with concurrent alcohol use in older adults.

Survey data from 2020 of older adults in Lexington was used to derive descriptive statistics and identify the prevalence of these interactions. The descriptive statistics included number of alcohol-interactive medications reported, number of alcohol-interactive conditions reported, and alcohol use reported as number of drinks per week or number of drinks per month.

Of the study participants surveyed, 62/92 (57%) reported being current drinkers. In addition, 100% reported taking an alcohol-interactive medication and 100% reported an alcohol-interactive medical condition. Furthermore, the average number of alcohol-interactive medications reported was 4.29 +/- 1.91. The average number of alcohol-interactive disease states reported amongst participants was 2.35 +/- 1.01. The highest risk participants are those who consume alcohol the most frequently and reported taking a high number of alcohol-interactive medications and having a high number of alcohol-interactive disease states. Thus, 18/92 (19.6%) participants reported taking 4 or more alcohol-interactive medications and drinking 3 or more drinks per week. In contrast, only 6/92 (6.5%) participants reported having 4 or more alcohol-interactive disease states and having 3 or more drinks per week. The most commonly report alcohol-interactive medications were anticoagulants and antihypertensives. The most reported alcohol-interactive medical conditions were hypertension gastroesophageal reflux disease.

This study found that there is a significant number of older adults in the Lexington area that take alcohol-interactive medications or have alcohol-interactive disease states and are concurrent drinkers. There is also a smaller prevalence of older adults who are very high risk of interactions, as they reported drinking frequently and having a high number of alcohol-

interactive medications and disease states. These interactions pose health concerns for this demographic and ways to address this issue needs to be investigated further.

Background

It has been well established that alcohol has the potential to cause a wide variety of health issues. In the Global Status Report on Alcohol and Health 2018, the World Health Organization outlined over 200 health conditions in which alcohol plays a role in causing or worsening in some way. Some of these health conditions include liver disease, heart disease and pancreatitis (WHO, 2018). Not only can alcohol use potentially lead to the development of these health conditions, but it can also exacerbate existing health conditions. Some examples of conditions that may be exacerbated by alcohol use include dementia, gastrointestinal bleeds, and orthostatic hypotension, among others (WHO, 2018). The risk of alcohol use doesn't stop there, as there are many medications that alcohol directly interacts with when taken together. There is potential for medications to alter the metabolism of alcohol, which could lead to increased levels of alcohol in the body and greater cognitive impairment, and there is potential for alcohol to alter the metabolism of other medications, which could cause the medication to be present at subtherapeutic or toxic levels in the body (Weathermon et al., 1999).

The potential complications described above are important to monitor in all individuals, but especially in older adults, which is defined in most cases as people over the age of 65 years. Older adults are at increased risk of falls, dementia, major bleeds, and heart disease. Not only can these health issues be exacerbated when combined with alcohol use, but the medications

that are commonly prescribed for some of these disease states can directly interact with

alcohol as well.

The prevalence of alcohol use in older adults is estimated to be high. A recent study

estimated that 65% of Americans over the age of 65 are high-risk drinkers (Grant et al., 2017),

while another study that looked at drinking behaviors of older adults estimated that 10.6% of

older adults are classified as binge drinkers (Han et al., 2019). In addition to the risks associated

with alcohol use alone in older adults, there is data showing that Americans over the age of 65

are the highest risk demographic in terms of taking a medication that interacts with alcohol

(Breslow et al, 2015).   Given the high estimated prevalence of alcohol use and high risk of

complications in older adults, this health issue remains pertinent and is an area where

interventions can be made.

Literature Review

There are many studies that have investigated alcohol-interactive medications, but a

lack of a consensus list of medications that negatively interact with alcohol. For example, a

systematic review of alcohol-interactive medications and alcohol in older adults performed by

Holton et al. (2017) found that out of nine different studies, there was no consistent list of

medications that researchers for each study deemed "alcohol-interactive". This lack of

consensus was a major limitation of this systematic review and led to a less reliable estimate of

incidence of concurrent medication use with alcohol in older adults. This review estimated that

incidence of concurrent use of alcohol and alcohol-interactive medications in older adults was

between 21% - 35%. This study shows that there is a significant incidence of concurrent use, but further studies need to be done to compile a universal list of alcohol-interactive medications. One trial attempted to fill this gap in knowledge. In 2015, Breslow et al. conducted a large study investigating the use of alcohol-interactive medications and current drinkers. This study used data from the National Health and Nutrition Examination Survey (NHANES) from 1999-2010 and analyzed the medications and alcohol use of 26,657 adults over the age of 20 years. This study expanded on the only previous study to investigate alcohol-interactive medication use at a national level, conducted by Jalbert et al (2008). Jalbert et al. focused on medications that can alter the metabolism of alcohol and intensify its effects, which is now thought to only be part of the concern. Breslow et al. created a list of medications using multiple different publications and online resources, and found that there were many more alcohol-interactive medications than just those that intensify the effects of alcohol. Their study stratified participants based on age, and they found that among older adults who were current drinkers, 77.8% used alcohol-interactive medications.

This study demonstrated an issue with older adult drinkers and concurrent alcohol-interactive medications use, but it remains to be seen whether any changes in prevention or screening have occurred since this study. Currently, the US Preventative Services Task Force recommends screening for adults over the age of 18 years for alcohol misuse or abuse (Moyer, 2013). The issue is that this screening is only aimed toward risky behaviors associated with alcohol abuse. The important distinction to make is that older adults don't need to abuse alcohol to have serious consequences if they are taking an alcohol interactive medication. Even low levels of alcohol in an older adult's body can interact with their medication and cause

potentially life-threatening complications. Thus, current screening recommendations fail to address a demographic of patients that should be screened.

Recent literature suggests that framing alcohol screening in terms of how alcohol use can interact with current medications may result in patients more willing to quit alcohol or limit its use when taking an alcohol-interactive medication. For example, a study performed by Madden et al. (2019) evaluated a small population of adults and their willingness to discuss their alcohol use with a community pharmacist. The authors found that 23/25 of these adults who drink alcohol at varying levels were more open to the idea of discussing alcohol use with their pharmacist if it relates to their medications or medical conditions. One participant stated "Link it to the medication because that's why I'm there in the first place. That would be my expectation. If they ask me just as a general…I'd think, well, what's it got to do with you?" (Madden et al., 2019). This participant highlights that addressing alcohol use as a lifestyle intervention may cause more defensive patients than addressing alcohol use as a medication or medical condition issue. Screening patients for alcohol in terms of alcohol-interactive medications would not only reach a large population of drinkers, but also may appear less judgmental and result in more successful interventions.

Currently, alcohol and substance use interventions are mainly performed by primary care physicians. A 2017 study showed that for patients ages 20 and up, an average time of 65.8 minutes was spent with their primary care physician per year. This may highlight a gap in care, as thorough alcohol use intervention likely can't happen in that short period of time. There is a role for community pharmacists to play in this gap in care, as community pharmacists spend much more time face-to-face with patients than primary care physicians.

Methods

The purpose of this study was to investigate a population of adults in Lexington, KY over the age of 65 and analyze their medication list, past medical history, and average alcohol use to determine the prevalence of alcohol-interactive medications and disease states. This study was a post-hoc analysis of the INtervention for Cognitive Reserve Enhancement in delaying the onset of Alzheimer's Symptomatic Expression (INCREASE) trial. The INCREASE trial evaluated older adults in Lexington to determine if medication therapy management services would have an impact on medication inappropriateness amongst this population, in hopes of reducing the rate of cognitive decline in these adults and slow progression to dementia. The INCREASE trial enrolled 104 adults in Lexington, KY over the age of 65. The study population can be described as adults over the age of 65 who are non-demented, community-dwelling, medically stable and report taking at least one medication on BEERS 2015 criteria list (J Am Geriatr Soc 2015). BEERS 2015 criteria list is a list of medications deemed potentially harmful in the elderly. All participants completed a lifestyle questionnaire, which included questions regarding average alcohol use. Other pertinent data collected includes a full list of their prescription and non-prescription medications and a full list of their past medical history.

Participants were electronically logged using a RedCap survey, which included alcohol-use status, number of alcohol-interactive medications, number of alcohol-interactive disease states and Charleston comorbidity index. RedCap is a platform which allows researchers to log data and export the data into various programs for data analysis.

INCREASE trial participants reported alcohol use on the lifestyle questionnaire as one of the following categories: never or less than once per month, 1-3 per month, 1 per week, 2-4 per

week, 5-6 per week, 1 per day, 2-3 per day, 4-5 per day or 6+ per day. They reported their usage for beer, liquor and wine individually. Given the scope of the INCREASE trial lifestyle questionnaire, alcohol use for this study was described as "non-current drinker" if participants reported never drinking or drinking less than one drink per month, "current drinker" if participants reported drinking one or more drink per month, and "frequent drinker" if participants reported drinking 3 or more drinks per week.

The National Institute of Alcohol Abuse and Alcoholism (NIAAA) defines alcohol use differently than the scope of this study. The NIAAA defines moderate drinking as 2 or fewer drinks per day for men and 1 or fewer drinks per day for women. The NIAAA defines heavy drinking as more than 4 drinks on any day or more than 14 drinks per week for men, and more than 3 drinks on any day or more than 7 drinks per week. (Dietary Guidelines for Americans, 2020-2025). These definitions are appropriate for alcohol abuse, but do not accurately depict risky drinking behaviors as they relate to interactions with medications and disease states, as even small amounts of alcohol consumption could cause adverse interactions. Thus, alcohol use is defined differently for this study.

Medications that are described as alcohol-interactive include central nervous system agents, cardiovascular agents, anticoagulants, gastrointestinal agents, antidepressants, antipsychotics antihyperglycemic agents and antihistamines. When taken with alcohol, these medications may cause increased sedation, dizziness, increased risk of gastrointestinal bleeding, hypoglycemia, seizures, hypotension, insomnia, and worsening depression. Collaboration with pharmacists at University of Kentucky Healthcare was utilized to determine a comprehensive list of these medications for comparison in our study population.

Disease states or medical conditions that have the potential to be caused by alcohol or exacerbated by alcohol include central nervous system depression (fall risk), gastrointestinal bleeds and irritation, hypotension (fall risk), seizures, hypertension, gout, insomnia, depression, liver disease, and breast cancer. Similarly, pharmacists at University of Kentucky Healthcare were consulted to determine a list of disease states that are deemed alcohol-interactive, for a consensus list does not exist in the literature.

Results

For this study, 92 participants were analyzed, as 12 participants from the INCREASE trial did not give responses to the alcohol use portion of the questionnaire and will not be pertinent to this study. Of the 92 participants, 40/92 (43%) of participants reported never drinking or drinking less than 1 drink per month and were classified as non-current drinkers, 62/92 (57%) of participants reported drinking one or more drinks per month and are classified as current drinkers, and 30/92 (33%) of participants reported having more than three drinks per week and are classified as frequent drinkers.

Of the 92 participants included in this study, 100% reported taking an alcohol-interactive medication and 100% reported an alcohol-interactive medical condition. The average number of alcohol-interactive medications reported was 4.29 +/- 1.91. The average number of alcohol-interactive disease states reported amongst participants was 2.35 +/- 1.01. A total of 18/92 (19.6%) participants reported taking 4 or more alcohol-interactive medications and drinking 3 or more drinks per week. Only 6/92 (6.5%) participants reported having 4 or more alcohol-interactive disease states and having 3 or more drinks per week. The most

commonly report alcohol-interactive medications were anticoagulants and antihypertensives. The most reported alcohol-interactive medical conditions were hypertension and gastroesophageal reflux disease.

# of AI medications	Non-current drinker	Current drinker	Frequent drinker	Total
1-3	19	7	12	38
4-6	13	13	15	41
7-9	8	2	3	13
Total	40	22	30	92

Table 1: Alcohol-interactive (AI)-med frequency distribution

# of AI conditions	Non-current drinker	Current drinker	Frequent drinker	Total
1	11	3	4	18
2	13	11	14	38
3	12	6	6	24
4	3	2	4	9
5	1		2	3
Total	40	22	30	92

Table 2: Alcohol-interactive (AI)-condition frequency distribution

BEERS list medications are thought of as medications that should be used with caution in the elderly population, as they may potentiate a number of adverse effects, such as hypotension, falls, and gastrointestinal bleeding. The number of alcohol-interactive medications can be compared to the average number of BEERS list medications, which is 2.47 for this study

population, indicating that alcohol-interactive medications may be even more prevalent than BEERS list medications and warrant more in-depth screening. Of note, the total number of medications that are both on the BEERS criteria list and the alcohol-interactive list was 29/221 (13.9%) for this study population.

Discussion

This study had multiple limitations. First, the study was limited using another study's data. The INCREASE trial surveyed participants with very specific questions, much of which could not be utilized in this study. In addition to all the INCREASE trial survey questions not being able to be used, there were certain questions that would have been very pertinent to this study that were unable to be used because the survey was already completed, and the participants could not be reached. This limitation prevented the study from investigating this issue further through more thorough survey questions and follow up surveys. These missing components should be of interest in future studies, as follow up surveys would allow researchers comparative data to analyze.

Another limitation of this study was that the measure of alcohol use was not as precise as it ideally would have been. Ideally, this study would have been able to analyze exactly how many were "never drinkers", but the survey phrased the question as "never or less than 1 per month". Having more specific information would help us identity a likely high number of "current drinkers". With more accurate drinking frequency, researchers could better differentiate high and low risk of interactions by looking at specific drinking times and medication administration times.

The study was also limited by the fact that one of the inclusion criteria for the patient population in the INCREASE trial was that they had to have at least 1 medication that is on the BEERS list. The BEERS list contains nearly 100 medications that are deemed to be potentially harmful for the elderly. Some of these medications also are included on the alcohol-interactive medication list, so the prevalence of older adults using alcohol-interactive medications in this study may be overestimated.

Lastly, this post-hoc analysis was limited as it investigated 92 older adults in Lexington, KY. This study is unable to be universally applied to the general population because of the small scope of this local study. In addition, the scope of this study only included 1 time point. It would be valuable to know how study participants compare prior to a proposed intervention over a longitudinal period. Future studies should attempt to broaden the scope of this study by including national data and a longer trial period to determine the broader prevalence of this issue.

This study identified a significant health concern in this patient population. It can be debated whether this study underestimates or overestimates the prevalence of these issues. The limitations mentioned previously may overestimate the prevalence of these issues. However, adults who volunteer for clinical studies are often healthier individuals, so this patient population may underestimate the broader prevalence of these health concerns.

Policy Implications

Current efforts to address alcohol use in older adults are framed around alcohol abuse and addiction. This framework misses a large portion of these adults and fails to address the

negative side effects that can happen even when drinking alcohol in moderation. The prevalence of alcohol interactions identified in this study provides insight into a need for new policy changes in healthcare systems and pharmacies.

Pharmacy students are educated in alcohol abuse counseling as a part of medication therapy management interviews. During these interviews, pharmacy students ask patients about medications, past medical history, and social history, which includes alcohol, tobacco, and illicit substance use. However, there is little education on how to address alcohol use unless patients are heavy drinkers and suffering from addiction. All the information that is needed from patient interviews is currently being asked, but we are failing to properly address alcohol use in terms of how it can worsen disease states and interact with medications.

As mentioned previously, current literature suggests that patients may be more receptive to having a conversation with their healthcare provider about alcohol use if it is framed in terms of negative interactions. This policy change could be easily implemented in pharmacy school curriculum, as it would not require a complete reworking of the material, rather additional education on how to address potential interactions.

In conclusion, alcohol use with concurrent alcohol-interactive medications and disease states can lead to serious health problems in older adults. This study identified a prevalent issue but necessitates further research to assess follow up and additional metrics regarding these interactions. In addition, ways to better intervene in these patients' health, such as a pharmacist-led protocol and reworking pharmacy student curriculum, should be investigated.

Appendix

List of meds looked at and how they interact with alcohol

Medication	Count
alprazolam	2
amiloride	1
amiodarone	1
amitriptyline	3
amlodipine	15
amphetamine/dextroamphetamine	1
aspirin	16
atenolol	3
benazepril	2
bisoprolol	1
bupropion	4
buspirone	2
carisoprodol	1
carvedilol	3
celecoxib	2
chlorpheniramine	1
chlorthalidone	1
citalopram	2
clonazepam	1
clonidine	1
cyclobenzaprine	3
diclofenac	3
diclofenac gel	1
diphenhydramine	4
duloxetine	2
escitalopram	3
fexofenadine	2
fluoxetine	1
furosemide	2
gabapentin	9
glimiperide	1
glipizide	1
hydralazine	1

hydrochlorothiazide	11
hydrocodone	1
hydroxyzine	2
ibuprofen	3
imipramine	1
indomethacin	1
insulin	3
irbesartan	2
isocarboxazid	1
lisinopril	9
lorazepam	1
losartan	11
meloxicam	6
memantine	1
methotrexate	1
metoprolol	14
nabumetone	1
nadolol	1
naproxen	3
nifedipine	1
olmesartan	1
oxcarbazepine	1
paroxetine	4
pramipexole	1
prednisolone	1
pregabalin	4
propranolol	2
ranitidine	11
ranolazine	1
rivaroxaban	2
sertraline	2
spironolactone	2
sulindac	1
temazepam	1
tizanidine	1
topiramate	1
tramadol	3
trazodone	1
triamterene	1

valsartan	5
venlafaxine	1
verapamil	1
vortioxetine	1
zolpidem	2
Grand Total	**221**

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