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# Evaluation of potential drug- drug interactions among medications prescribed to a sample of hypertensive Iraqi patients

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***ABSTRACT:*** *One of the most important adverse medication reactions is drug_drug interactions ( DDIs). It increases morbidity and mortality rate, elderly patients with essential hypertension (HT) have the tendency to prescribe multiple medications and this may expose them to some (DDIs) especially in the perspective of physiological alterations because of ageing process. The objective is to evaluate potential DDIs among medication prescribed to 180 hypertensive patients in AL-Yarmook hospital in Baghdad-Iraq.*

**Keywords:** Antihypertensive drugs, drug-drug interactions, hypertension, Medscape drug interaction checker.

**Introduction:** There are many chronic diseases increased in occurrence nowadays, the most popular one is hypertension (HT) **(1).** It is one of the commonest causes of death globally (2)**.** In 2013, 44% of Iraqi populations have hypertension**. (3)**

The occurrence of HT in addition to polypharmacy in old age group with diminish in physiological functions all are factors increased the incidence of DDIs**(4)** In the united states the sixth cause of death because of Serious Adverse Event (SAE) among hospitalized patients, while DDIs considered the most common SAE this necessitate studies about any DDIs in prescriptions in order to prevent any SAE effect on patients and costs the healthcare system **(5).** Antihypertensive medications showed interactions by sharing the same metabolic pathways with other medications either by inhibition or by induction the metabolism of other treatment **(6)**

**Materials and methods:** This study was conducted on (180) hypertensive inpatients during six months period started from September 2022 until February 2023 at Al-Yarmouk Teaching Hospital/ Baghdad Province/ Iraq. The medicine ward was the source of data in this study. Prescriptions were analyzed for the pattern and rate of DDIs using Medscape drug interaction checker.

## Results

**Table 1: Demographic details of the study population:**

| Demographics data | Number of patients (*n*=180) | Percentage |
|---|---|---|
| Gender | | |
| Male | 112 | (62.2%) |
| Female | 68 | (37.7%) |
| Age (years) | | |
| <40 | 5 | (2.77%) |
| 40-60 | 63 | (34.96%) |
| >60 | 112 | (62.16%) |
| Co-morbidities | | |
| No | 25 | (13.8%) |
| Yes | 155 | (86.2%) |
| DM | 87 | (48.28%) |
| CVD | 81 | (45%) |

| | | |
|---|---|---|
| CKD | 13 | (7.215%) |
| Asthma & COPD | 10 | (5.55%) |

*DM: diabetes mellitus , CVD: cardiovascular disease , CKD : Chronic kidney disease , COPD : chronic obstructive pulmonary disease.

**Table 2: Pattern of potential drug-drug interactions:**

| Number of drug interactions | Number | Percentage |
|---|---|---|
| Present | 120 | (66.6%) |
| Absent | 60 | (33.4%) |
| Number of DDI per patient | 70 | 58.3% |
| 1 | 26 | 21.6% |
| 2 | 9 | 7.5% |
| 3 | 15 | 12.5% |

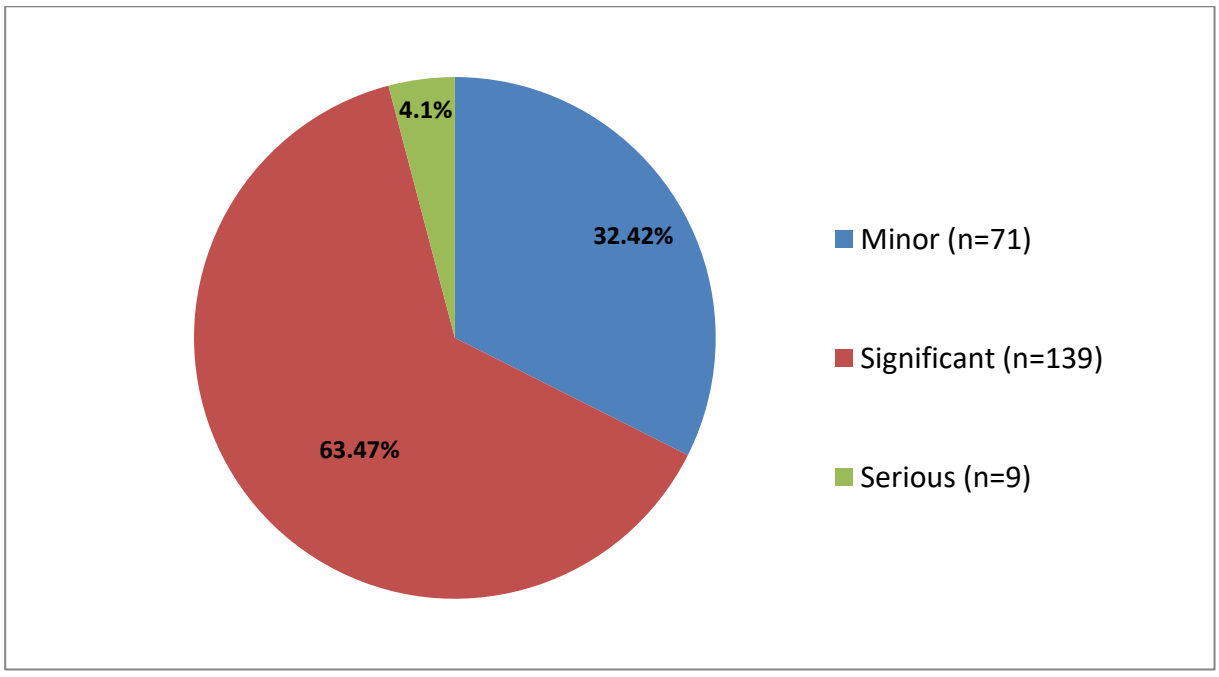


**Figure 1: Frequency of severity of drug-drug interactions of antihypertensive drugs**

**Table 3: Distribution of potential drug interacting pairs among groups of anti-hypertensive**

| DDI | Frequency | Percent |
|---|---|---|
| Cephalosporin | 40 | 18.34% |
| Antihypertensive | 39 | 17.8893% |
| NSAIDs (Aspirin) | 31 | 14.219% |
| Hormone | 30 | 13.76% |
| $\beta_2$agonist | 19 | 8.715% |
| Mineral supplements | 15 | 6.88% |
| Vitamins | 12 | 5.49% |
| Statins | 7 | 3.21% |
| Anticoagulant | 6 | 2.75% |
| Corticosteroids | 5 | 2.29% |
| Anticonvulsant | 3 | 1.37% |
| Anti-dysrhythmics | 3 | 1.37% |
| Calcium salt | 2 | 0.9174% |
| Biguanides | 1 | 0.45% |
| Anti-platelet | 1 | 0.45% |
| Anti-mycobacterials | 1 | 0.45% |
| Antacid | 1 | 0.45% |
| Antifungal | 1 | 0.45% |
| Antipsychotic | 1 | 0.45% |

## Discussion

Among the 180 prescriptions of hypertensive patients analyzed in this study approximately (219) paired Drug_Drug Interactions (pDDIs ) were found. The number of pDDIs is higher than number of prescriptions, since there are more than one interaction in some prescriptions. In this study the prevalence of DDIs found was (66.6%) in patients receiving antihypertensive drugs (Table 2). This percentage is higher than the frequency of DDIs in other countries such as Thailand (27.9%).[7] However this reflects the high prevalence of HT rate of (62.16%) found among elderly patients >60 years (Table 1). This result is similar to other analytical studies[8],but slightly higher than (59.4%) of Nigerian study[9].The reason might be related to the fact that elderly patients are at higher risk for DDIs because they are probably having many diseases and polypharmacy that generally occur with long term of disease condition and change physiology. Moreover, many studies reported that the age more than 60 is an independent risk factor for DDIs. [10], while other studies have shown that the majority of the hypertensive patients(56%)were in the age group of(40–60) years old. [11] In term of gender effect, this study showed that DDIs were common in male patients (62.2%) compared to females which could be due to both biological and behavioral factors that could increase BP (Table 1). The biological factors include sex hormones, chromosomal differences , behavioral risk factors for HT include, smoking, use of tobacco, and alcohol or raised TG and cholesterol levels.[11, 12]

This study has revealed that (86.2%) of the hypertensive patients have co-morbidities and the most common one was DM (48.28%)(Table 2).This might be due to the pathophysiology of HT in diabetes which involves maladaptive changes and complex interactions between the autonomic nervous system, mechanical forces, and renin-angiotensin-aldosterone system as well as individual and environmental factors.[13] Moreover the frequency of CVDs was also high (45%) (Table 2) The rapid development of economics simultaneously resulted in high fat diet, unhealthy lifestyle, and greater stress that might lead to the above diseases.[14]

## Conclusion

DDIs might be significant or serious; it increases by increment of the number of drugs prescribed, consequently these results raise the concern for the need to have adequate information about DDIs by the health care givers. Moreover, providing health institutions with electronic health systems with programs software to detect DDIs would help to reduce these interactions.j

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