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Chronotheraputic Implication of Antihypertensive Drugs

Sayed Mahmood Alqallaf* and Afaf S. Taher

Pharmacy Program, College of Health Sciences, University of Bahrain, Bahrain International Circuit, Zallaq, Bahrain

Introduction

Chronotherapy involves the administration of medication in relation with the body's circadian rhythm aiming at maximizing medication efficacy and minimizing toxicity. This is based on the findings that the effectiveness and toxicity of many drugs variation depending on the time of administration in relation to 24-hour rhythms of biochemical, physiological and behavioral processes. However, the functions of the human body might vary on daily basis, which might lead to changes in both patients' disease state, and the plasma dug concentration.

Each disease follows the body's circadian rhythm. Therefore, to treat each disease medication needs to be administered at time related to the circadian rhythms of the body in order to achieve the best outcomes. An example of this is the administrations of the NSAIDs in rheumatoid arthritis before the pain reach its peak to obtain best efficacy. Another example is the recommended use of statins at night because of the higher efficacy of the enzyme (HMG-CoA reductase) involved in cholesterol synthesis. This study aims to investigate patients' knowledge on the timing of administration of their antihypertensive medication.

Methods

The Methods used to collect the necessary information for this project was through PubMed and Google search using the terms Hypertension, chronic therapy, chronic therapy of hypertension, hypertension medication timing. More data were collected from a survey that was conducted, in which 100 hypertensive patients from different age groups and educational levels answered questions regarding their use of hypertension medications. The data collected was analyzed using Microsoft Excel.

The timing of participants' intake of their medications is shown in Table 1.

Drug name	Administration Timing		
	Morning	Afternoon	Night
Amlodipine	79 %	6 %	15%
Diltiazem	0%	100 %	0 %
Atenolol	92%	8 %	0 %
Bisoprolol	0 %	100 %	0 %
Propranolol	100 %	0 %	0 %
Perindopril	96 %	0%	4 %
Perindopril + Indapamide	100 %	0 %	0 %
Perindopril + Amlodipine	100 %	0 %	0%
Valsartan	86 %	7 %	7 %
Valsartan + Hydrochlorothiazide	67 %	10 %	24 %
Irbesartan	100%	0 %	0 %
Irbesartan+ Hydrochlorothiazide	75 %	0 %	25 %

Table 1: The time participants use their medications.

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The main finding of this study was that the majority of participants are using calcium channel blockers (CCB) and beta-blockers in the morning. This is in contrast to studies that reported that CCB have similar efficacy independently of dosing time [1,2]. However, exceptions do exist as it was reported that evening nitrendipine and evening isradipine is more effective [1]. Beta-blockers dosing is preferred at bedtime as suggested by a study on nebivolol [1], but no difference in efficacy was found with atenolol [2]. In regard to the ACEI (Angiotensin Converting Enzyme Inhibitors), most of the participants are taking it in the morning, although studies mentioned that the evening dosing has higher efficacy [1,2]. Some studies found no significant differences between morning versus evening ACEI dosing if given in high doses [1]. Similarly, most of the ARBs users are taking their doses in the morning, although studies mentioned that its better to be administered at bedtime [1,3,2]. In general, some studies are suggesting moving the administration of all non-diuretics antihypertensive medication to the evening as it was shown to more effective [4,5]. Additionally, results indicate that the participants have received enough counseling about their medications from the physician and pharmacist as been revealed by the participants.

Competing Interests

The authors declare that they have no competing interests.

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***Corresponding Author:** Dr. Sayed Mahmood Alqallaf, Pharmacy Program, College of Health Sciences, University of Bahrain, Bahrain International Circuit, Zallaq, Bahrain; E-mail: smalqallaf@uob.edu.bh

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