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CLINICAL PHARMACOLOGY OF PSYCHOTROPIC DRUGS

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ANNOTATION

There are many reasons why once a day oral dosage may be advantageous in administration of psychotropic drugs to mental patients, such as convenience for the patient, avoided side effects, ease of remembering, all of which contribute to reliable dosage as well as cost savings. This paper illustrates cost data, pharmacokinetics of psychotropic drugs, and suggests a basis for determining adequate pill size for unit dosage. On a cost per milligram basis, there is economic savings if medication is prescribed in the largest size the patient can conveniently take. Pharmacological data support a rationale for higher unit dosage. They indicate a dose response relationship between dose and therapeutic effectiveness and probably a blood level relationship. The long half-life indicates that once-a-day medication is a reasonable dosage schedule. The most important evidence for once-a-day medication, however, is the empirical evidence that it works, and is safe. Dosage information from double blind investigations provides a basis for determining adequacy of pill size for antipsychotic therapy.

Keywords: Psychotropic drug, antipsychotic therapy, gamma-aminobutyric, depression, pharmacology, behavior.

INTRODUCTION

Psychotropic drug, in pharmacology, any agent that induces changes in awareness, behaviour, mood, perception, or sensation. Most psychotropic drugs are classified as one of five different types: antianxiety agents, antidepressants, antipsychotics, hypnotics, or mood-stabilizing drugs. Psychotropic drugs are used to treat a broad array of conditions, from sleep disorders and pain to anxiety, depression, and psychosis.

Psychotropic drugs exert their actions by either mimicking the effects, blocking the activity, or altering the storage, release, or uptake of neurotransmitters (signaling molecules in the brain that relay information between neurons and between neurons and other types of cells). Some psychotropic drugs restore the balance of neurotransmitters by preventing their breakdown once released from neurons. Examples of neurotransmitters that can be affected by psychotropic drugs include dopamine, gamma-aminobutyric acid (GABA), norepinephrine, and serotonin. The five main classes of psychotropic drugs are distinguished primarily by the effects that result from their actions on neurotransmitters. Many antianxiety drugs, for example, are benzodiazepine compounds (e.g., clonazepam, diazepam), which bind to neurons at locations near ion channels that admit chloride ions into the cell and also near sites of action for GABA. GABA exerts inhibitory actions on certain neurons and thereby reduces the transmission of nerve impulses; benzodiazepines

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generally enhance the effects of GABA, resulting in a calming effect. Other antianxiety drugs have similar physiological effects but do not act on GABA. Buspirone, for example, is thought to be a partial agonist of receptors for serotonin, the activity of which is associated with mood changes.

In the ATC classificatory system, the anatomical site of action could be the CNS (e.g., carbamazepine), the respiratory system (e.g., salbutamol), the cardiovascular system (e.g., digoxin), the gastrointestinal system (e.g., omeprazole), and so on. A problem here is that, for example, antimicrobials and antineoplastic drugs do not act on a specific anatomical system; however, they do act at a specific anatomical target, such as bacterial or neoplastic cells. Vitamins are other examples of drugs that are hard to classify with regard to an anatomical target.

For Level 1 CNS drugs, Level 2 includes analgesics, anesthetics, antiepileptics, anxiolytics, antidepressants, antipsychotics, antidementia drugs, mood stabilizers, hypnotics, and others. A problem here is that drugs are classified according to the original indication for which they were studied and approved. However, many drugs have many indications. For example, SSRIs have demonstrated efficacy in depression, generalized anxiety disorder, panic disorder, social anxiety disorder, posttraumatic stress disorder, obsessive-compulsive disorder (OCD), premenstrual dysphoric disorder, migraine (prophylaxis), and other conditions. Nevertheless, SSRIs are still classified as antidepressants.

Similarly, antipsychotics such as aripiprazole are effective in schizophrenia, in mania, as antidepressant augmentation treatment in major depressive disorder, as SSRI augmentation treatment in OCD, and in the treatment of delirium. Quetiapine and lurasidone are specifically effective as monotherapy for bipolar depression, and quetiapine is effective as monotherapy for generalized anxiety disorder. Some of these are not approved indications but are indications for off-label use.

Mechanism of action

Psychoactive drugs are thought to exert their effect through actions on the neurotransmitters in the central nervous system (CNS). Thus far, over 100 neurotransmitters have been identified. The most important ones include gamma amino butyric acid (GABA), acetylcholine (Ach) and the biogenic amines (monoamines), of which the last can be further subdivided into tryptophan-derived indoleamines (serotonin and melatonin) and tyrosine-derived catecholamines (dopamine, norepinephrine, and epinephrine) (Table 5-5). Following the depolarization of the presynaptic cell membrane, neurotransmitters are released into the synaptic cleft. These released neurotransmitters then bind to the receptors, which results in the transduction of the signal to the postsynaptic membrane. Signal transduction ceases again upon deactivation of the activity of the neurotransmitters. This may occur through enzymatic degradation, reuptake in the presynaptic cell via membrane channels, and activation of the autoreceptors (located on the presynaptic membrane) that block the continued release of the neurotransmitters.

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