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COMMENTARY

The effects of dagga on the brain

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Introduction

Dagga, also known as cannabis or marijuana, is the most widely used illicit drug in many developed societies.[1] Users perceive dagga as relatively safe, compared to cocaine and heroine, and abuse dagga mainly for its euphoriant effect or 'high', which comes on within minutes of smoking and then reaches a plateau lasting two hours or more, depending on dose. Many of the users give the main reason for taking dagga as simply being for 'pleasure'.[2] Although this drug is widely perceived as a 'soft' drug that has little or possibly no effect on the user, we would like to discuss psychological and physical effects of the drug mentioned in the literature, as well as make a link between dagga abuse and impaired psychological development and its effect on academic performance. The educational difficulties that dagga users may develop and that we discuss, are based on anatomical evidence. The authors would like to stress that cultural and religious principles (eg. Rastafarian beliefs) as well as the economic implications for South Africa were not investigated and are beyond the scope of this article.

Dagga is smoked as joints, from pipes, or from 'buckets', by inhaling from a mass of plant or resin ignited in a sawn-off plastic bottle.[3] It can also be eaten, baked into cookies or cakes, or occasionally drunk as an extract. Dagga contains a complex mixture of compounds including delta9-tetrahydrocannabinol (THC), the major psychoactive constituent, and cannabidiol (CBD), a nonpsychoactive constituent.[4] Cannabinoids, the active components of the *Cannabis sativa* plant[5] are present in the stalks, leaves, flowers and seeds of the plant, and also in the resin secreted by the female plant.[3]

The danger between the dagga used today and that of 20 to 30 years ago, lies in the fact that sophisticated cultivation (such as hydroponic farming) and plant-breeding techniques, have greatly increased the potency of product.[3] According to Ashton in 2001, in the 'flower power' days of the 1960s and 1970s, an average dagga 'reefer' contained about 10 mg of THC.[3] Now a joint made out of skunkweed, netherweed and other potent subspecies of *Cannabis sativa* may contain around 150 mg of THC, or 300 mg if laced with hashish oil. Current users of dagga may presently be exposed to doses of THC many times greater than his or her counterpart in the 1960s and 1970s.[6-10] Research that was relevant and true in the 1970s is now obsolete because we are currently dealing with a much more potent drug than before.[7]

Maykut in 1985[11] and Agurell and coworkers in 1986[12] reviewed the pharmacokinetics of cannabinoids. Effects of smoking dagga are within seconds and are much faster than oral ingestion. The onset of the effect of taking dagga orally is between 0.5-2 hours, but the effect is much longer than when the dagga is smoked, because of the continued slow absorption within the alimentary canal. About 50% of the THC in a joint of herbal dagga is inhaled in the mainstream smoke; nearly all of this is absorbed through the lungs, rapidly enters the bloodstream and reaches the brain within minutes. Once absorbed, cannabinoids are rapidly distributed to all other tissues at rates dependent on the blood flow. Because they are extremely lipid soluble, cannabinoids accumulate in fatty tissues from where they are slowly released back into other body tissue including the brain. Maykut in 1985 mentioned that because of the storage in fat, the tissue elimination half-life of THC is about seven days, and complete elimination of a single dose may take up to 30 days.[11] Therefore, with repeated usage of the drug high levels of cannabinoids can accumulate in the body and continue to reach the brain, reaching the neocortical, limbic, sensory and motor areas. Furthermore, Johns in 2001 mentioned that early initiation of dagga use might predict an increased risk of escalation in risk and progression to other drugs.[13]

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Psychological deficits caused by dagga

Dagga produces dysphoric reactions and psychological responses, including severe anxiety and panic, paranoia, mood changes, flashbacks, depression, depersonalisation, derealisation, a feeling of loss of control, fear of dying, irrational panic and paranoid ideas and psychosis (such as hearing voices or having unwarranted feelings of persecution or risk of harm from others).[13-16] Dagga also combines many of the properties of alcohol, tranquillisers, opiates and hallucinogens; it is anxiolytic, sedative, analgesic, psychedelic and it stimulates appetite. Furthermore, dagga produces reactions that include a feeling of intoxication and increased sociability. These reactions are dose-related and more common in naïve users, anxious subjects and psychologically vulnerable individuals. Szymanski in 1981[17] and Keshaven and Lishman in 1986[18] also mentioned extended depersonalisation after termination of dagga use. Furthermore, heavy daily users are often persons who cannot cope with depression or their life circumstances.[16]

Hall and coworkers in 1994 distinguished between different types of psychosis experienced by dagga users.[1] The authors mentioned that dagga usage might induce toxic or organic psychosis (with symptoms of confusion and hallucination); acute functional psychosis (similar to an acute schizophreniform state and lacking the organic features of a toxic psychosis); chronic psychosis (symptoms continuing after abstinence); organic psychosis (symptoms only partially remit after abstinence, leaving a residual deficit state, sometimes called an amotivational syndrome).

Johns in 2001 indicated that people taking dagga together with other drugs or alcohol seem to experience more severe mental health problems than those who solely take dagga and that there might be adverse effects of dagga usage on pre-