CANNABIS USE IN PSYCHIATRY INPATIENTS

by

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DECLARATION

This study represents the original work by the author and has not been submitted previously to this or any other University. The author wrote the protocols for all the research in this thesis. Where use was made of the work of others it has been duly acknowledged in the text.

The research described in this dissertation was carried out in the Department of Psychiatry, University of KwaZulu-Natal, under the supervision of Professor Margaret Gemma Nair and co-supervision of Professor Dan Lamla Mkize.

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Mvuyiso Talatala

DEDICATION

To my mother Margaret Nobefundisi Talatala and my family.

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9. Nursing Staff at the psychiatry ward and the medical wards, King Edward VIII Hospital for their tireless assistance with data collection.

10. The Department of Chemical Pathology, University of KwaZulu-Natal, Durban and the laboratory Staff at King Edward VIII Hospital for their assistance and guidance on urine cannabis testing.

11. The patients who agreed to participate in this study.

PRESENTATIONS EMANATING FROM THIS STUDY:

This study was presented on the 12th of August 2008 in the Congress of the South African Society of Psychiatrists that was held in George, South Africa.

ETHICAL APPROVAL

This study was approved by the Ethics Committee of the Nelson R Mandela School of Medicine, University of KwaZulu-Natal, Durban, South Africa. Reference number: H025/03.

ABSTRACT

Cannabis use in psychiatric inpatients

Background:

Cannabis among patients admitted in psychiatric units is higher than the general population and this has been shown in various countries where studies on cannabis use have been undertaken. Such an observation has been made by psychiatrists in South Africa and the association between cannabis use and psychotic presentation among these patients has also been observed. Cannabis use by patients with severe or chronic medical illnesses to ameliorate the symptoms of such illnesses has been documented in the literature. A study to explore use of cannabis among psychiatric inpatients as well as medical patients was undertaken.

Purpose:

The purpose of this study was to firstly determine the prevalence of cannabis use in psychiatric patients admitted to an acute admissions unit in King Edward VIII Hospital and to correlate it with the psychiatric diagnosis.
Secondly, it was to compare the cannabis use in psychiatric patients admitted to an acute admissions unit to patients admitted in a medical ward at King Edward VIII Hospital.

Thirdly, to assess self reporting of cannabis use by psychiatric and medical patients.

Methods:

A case control study was conducted at King Edward VIII Hospital, Durban, where cannabis use among 64 subjects included in the study admitted in a psychiatric ward was compared with a control group of 63 control subjects admitted in a medical ward. Both groups were tested for urinary cannabinoids and a questionnaire was filled. The questionnaire contained demographic details as well as a question on use of substances including cannabis.

Results:

17 subjects (26.6%) in the study group tested positive for urinary cannabinoids and 2 subjects (3.2%) in the control group tested positive. Cannabis use was significantly higher among males when compared to females in both the study group and the control group. Only 7 subjects in the study group reported cannabis use and out of those 7 subjects, 4 subjects tested positive for urinary cannabinoids. The commonest diagnosis among the study group subjects were the psychotic disorders and schizophrenia being the most common psychotic disorder.

Conclusion:

Cannabis use is significantly higher among psychiatric patients as compared to medical patients and it is probably higher than in the general population. Self reporting of cannabis use among psychiatric patients is low and unreliable and psychiatrists treating these patients must continue to use objective measures such as objective testing as well as collateral information to determine such use.

In this study most subjects who tested positive for urine cannabis were likely to have a psychotic disorder and tended to be of younger age groups. The low prevalence of cannabis use in the control group makes it unlikely that there was a significant number of subjects in this group who were using cannabis for medicinal purposes.

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LIST OF ABBREVIATIONS

AIDS   Acquired Immune Deficiency Syndrome

THC2   Cannabinoid 20ng reagent

THC   Delta 9 tetra hydrocannabinol

DSM-IV-TR   Diagnostic and Statistical Manual of Mental Disorders (Text Revision)

                    4th edition

GABA   Gamma Aminobutyric Acid

GC/MS   Gas Chromatography/Mass Spectrometry

GC   Gas Chromatography

MRC   Medical Research Council of South Africa

ng   Nanogram

NSDUH   National Surveys on Drug Use and Health

5HT3   Serotonin 3 Receptor

SACENDU   South African Community Epidemiology Network on Drug use

TLC   Thin Layer Chromatography

CHAPTER 1

INTRODUCTION

1.1   BACKGROUND

Psychiatrists are often of the opinion that cannabis use is common in South Africa among psychiatric inpatients. It is often observed that the patients who present with cannabis related psychotic disorders usually present with a different clinical presentation from those with other functional psychotic disorders. These observations by experienced psychiatrists are probably correct and they assist one in assessing and managing psychiatric patients especially those who are admitted in an acute admissions unit as the one at King Edward VIII hospital. However, there is a marked lack of evidence based psychiatric research to substantiate these clinical observations.

If these observations are correct then one would conclude that psychiatric patients with co morbid cannabis use require a different evaluation and management approach when compared with other psychiatric patients. During evaluation the reliability of these patients to voluntarily disclose cannabis use is questionable in a country like South Africa where cannabis possession remains illegal. Furthermore, there are no studies evaluating the management of these patients including the use of psychotropics. Further, it is well known that the potency of cannabis varies across geographic locations and it could be assumed that the effects of cannabis on humans

may vary from country to country (Rolfe 1993). South Africa should therefore conduct her own research on cannabis.

With these ideas and challenges in mind, it was decided that a study that would attempt to explore cannabis related issues be undertaken. With the results and conclusions of this study, further research should be done to answer many questions related to cannabis use that remained unanswered.

CHAPTER 2

REVIEW OF LITERATURE: CANNABIS AND PSYCHIATRY

2.1   OVERVIEW

Cannabis sativa is an indigenous plant in South Africa which has been known and often used as a herb for centuries. It grows naturally in most parts of the country, with particularly good harvests being obtained in the provinces of KwaZulu-Natal and the Eastern Cape. Cannabis sativa is cultivated in certain parts of the world for its fibre, which is used to make rope and cloth; for its seeds, which are used to make oil; and for its psychoactive resin (Macfadden and Woody in Kaplan and Sadock's Comprehensive Textbook of Psychiatry, 1999. p. 991). The potency of cannabis varies widely geographically, with reduced levels of the major active compound, delta-9 tetra hydrocannabinol (THC) found in plants grown in cold climates (Rolfe 1993). It is likely therefore that cannabis found in South Africa is highly potent as South Africa has a warmer climate. Cannabis sativa has more than 60 known cannabinoids and THC is the most psycho-actively potent. This highly lipophilic substance was first isolated and synthesized in 1964 and has been extensively studied in pharmacological laboratories (Ames 1995).

2.2   PHARMACOLOGY OF CANNABIS

2.2.1 Pharmacokinetics of cannabinoids

The amount of THC that enters the bloodstream and eventually reaches the brain from inhalation is more than that obtained from oral ingestion. About 50% of the THC in a joint (cigarette) of herbal cannabis is inhaled in the mainstream smoke (Ashton 2001). Nearly all of this is absorbed through the lungs, rapidly enters the bloodstream and reaches the brain within minutes. The percentage of THC that reaches the brain after ingestion is small as only 1% of THC penetrates the blood brain barrier (Macfadden and Woody in Kaplan and Sadock's Comprehensive Textbook of Psychiatry 1999. p. 993). The blood concentrations reached after oral ingestion are 25 – 30% of those obtained by smoking the same dose.

THC is lipid soluble and highly protein bound. It is rapidly distributed from blood to other tissues at a rate dependent on the blood flow. Cannabinoids accumulate in fatty tissues as they are extremely lipid soluble. After some equilibrium is reached between the concentrations in the blood and other tissues, THC slowly and unevenly re-enters the bloodstream from its tissue stores.

THC that reaches the liver is almost completely metabolised into the active 11-hydroxy-tetra hydrocannabinol and the inactive 9-carbxy-tetrahydrocannabinol. The active 11-hydroxy-tetra hydrocannabinol is further metabolised into many inactive

metabolites including 11-norcarboxy-delta-tetra hydrocannabinol which is detected within minutes after smoking. 11-norcarboxy-delta- hydrocannabinol is the most abundant metabolite in urine and plasma and it is the primary cannabinoid metabolite excreted in the urine and hence it is the metabolite usually screened for in routine toxicology analyses for cannabis use. It is detected within 2 – 3 days after smoking a single cannabis cigarette and for heavy cannabis users detectable levels can persist for up to 4 weeks (Macfadden and Woody in Kaplan and Sadock's Comprehensive Textbook of Psychiatry, 1999. p. 993).

THC blood levels peak in about 30 minutes and decline precipitously as it redistributes to undetectable levels within 3 – 4 hours (Macfadden and Woody in Kaplan and Sadock's Comprehensive Textbook of Psychiatry, 1999. p. 993).

Excretion of THC metabolites is mainly (65%) via the enterohepatic circulation into the faeces and the remainder is excreted via the kidneys (Ashton 2001). The enterohepatic circulation excretion into the gut also involves reabsorption of the metabolites which further prolongs their action (Ashton 2001).

2.2.2   Pharmacodynamics of cannabinoids

Cannabinoids exert their effect by interaction with specific endogenous cannabinoid receptors (Ashton 2001). A series of naturally occurring endogenous cannabinoids (endocannabinoids), of which anandamide has so far been the most intensively studied have been discovered (Iversen in Marijuana and Madness 2004 p. 19). Endocannabinoids and other synthetic cannabinoids also exert their effects on the cannabinoid receptors. The cannabinoid receptors have been identified in the neurones as well as in the spleen and the immune system. Those cannabinoid receptors found in the neurones are called CB1 receptors while those in the spleen and immune tissues are called CB2 receptors. CB1 receptors have been found in rat, guinea pig, dog, monkey, pig and human brains (Ashton 2001).

The distribution and the density of CB1 receptors is discussed by Macfadden and Woody (1999) and are further correlated with the observed effects of cannabis in the brain. The highest density of CB1 receptors is found in the basal ganglia and the molecular layer of the cerebellum. This correlates with its interference in motor co-ordination. Intermediate levels are found in the hippocampus, dentate gyrus and layers I and IV of the cortex. This is consistent with the cannabinoid effect on the short term memory and cognition. The brainstem areas controlling the cardiovascular and the respiratory functions have the low receptor density which is consistent with the cannabinoid lack of lethality.

The identification of the cannabinoid receptors, the presence of an endocannabinoid, and the discovery of a cannabinoid antagonist suggests the presence of a cannabinoid neurochemical pathway. The presynaptic localization of CB1 receptors suggests a role for cannabinoids in modulating the release of neurotransmitters from axon terminals (Iversen in Marijuana and Madness 2004 p. 21). Cannabinoids exert many of their actions by influencing several neurotransmitter systems and their modulators and these include acetylcholine, dopamine, gamma-aminobutyric acid (GABA), histamine, serotonin, noradrinaline, opioid peptides and prostaglandins.

2.3   EFFECTS OF CANNABIS IN HUMANS

Cannabis interacts with many neurotransmitter systems and as a result it affects many body systems. It combines many of the properties of alcohol, tranquillisers, opiates and hallucinogens. It is anxiolytic, sedative, analgesic, psychedelic; it stimulates appetite and has many systemic effects (Ashton 2001). Cannabis therefore has psychological as well as systemic effects. Psychological effects of cannabis as reviewed below include all effects of cannabis on one's mind. It is important to note that some authors describe some psychological effects of cannabis as untoward mental effects of cannabis and their classification of these untoward mental effects of cannabis excludes the desirable psychological effects of cannabis. Johns (2001) classifies the untoward mental effects of cannabis as follows:

- Psychological responses such as panic, anxiety, depression or psychosis.

- Effects of cannabis on pre-existing mental illness and cannabis as a risk factor for mental illness.

- Dependency or withdrawal effects.

These untoward mental effects are reviewed below as part of all effects of cannabis in the brain.

2.3.1 Psychological Effects of Cannabis

Psychologically cannabis has an effect on the mood, perception, cognition and psychomotor performance. Cannabis produces a euphoriant effect on the mood. This euphoria is characterised by a feeling of intoxication, with decreased anxiety, alertness,and depression and tension and increased sociability (if taken in friendly surroundings) (Ashton 2001). This change in the mood can be induced with doses of THC as low as 2.5 mg in a cigarette and it comes on within minutes of smoking and then reaches a plateau lasting 2 hours or more.

A part of the euphoria is the perceptual changes produced by cannabis (Ashton 2001). Colours may seem brighter, music more vivid, emotions more poignant and meaningful. Spatial perception is distorted and time perception is impaired so that perceived time goes faster than the clock time (Ashton 2001). With high doses hallucinations may occur (Ashton 2001).

Cannabis can produce dysphoric reactions including severe anxiety and panic, paranoia and psychosis. These are dose-related and common in naïve users, anxious subjects and psychologically vulnerable individuals (Ashton 2001). The aetiological significance of depression and cannabis abuse as risk factors for cannabis abuse and depression, respectively, is not well understood (Bovasso 2001). In a study that sought to estimate the degree to which cannabis abuse is a risk factor for depressive symptoms rather than an effort to self-medicate depression, it was established that participants with a diagnosis of cannabis abuse were more likely to develop depressive symptoms when compared with those who did not have a diagnosis of cannabis abuse (Bovasso 2001).

Cognitive effects and impairment of psychomotor performance are similar to those produced by alcohol and benzodiazepines. These include slowing of reaction time, motor inco-ordination, defects in short-term memory, difficulty in concentration and particular impairment in complex tasks which require divided attention (Ashton 2001). It has been suggested that these impairments especially attention, memory, and ability to process complex information can last for many weeks or even years after cessation of cannabis use especially in heavy long-term users (Ashton 2001).

Tolerance has been shown to develop to many effects of cannabis including the high and many systemic effects, and a cannabis withdrawal syndrome has been clearly demonstrated in controlled studies in both animals and man (Ashton 2001). The clinical features of a withdrawal syndrome include restlessness, insomnia, anxiety, increased aggression, anorexia, muscle tremor and autonomic effects. Chronic

cannabis use leads to cannabis dependence. This dependence is most likely both physiological and psychological. The neurochemical mechanisms underlying this cannabis dependence are still a matter of research and are reviewed by Roffman and Stephens (2006). With the use of mice it has been demonstrated that cannabinoid agonists elicit dependence through CB1 receptor mechanism of action. There are also interrelationships of the cannabinoid system with other neurochemical systems such as the dopaminergic and opiod systems, whose mechanisms in substance dependence are well known (Roffman and Stephens 2006 p. 45).

The 4th edition of the Diagnostic and Statistical Manual of the American Psychiatric Association (DSM-IV-TR) and the 10th edition of the International Classification of diseases (ICD 10) list several psychiatric disorders that are related to the use of cannabis (DSM-IV-TR 2000 p. 235 and p. 236). These disorders are divided into cannabis use disorders and cannabis induced disorders. Cannabis use disorders are cannabis dependence and cannabis abuse. Cannabis induced disorders include cannabis intoxication, cannabis intoxication delirium, cannabis induced psychotic disorder with delusions or with hallucinations, cannabis induced anxiety disorder and cannabis induced related disorder not otherwise specified. The 10th edition of the International Classification of Diseases (ICD 10) has similar classification (DSM-IV-TR 2000 p. 887).

The existence of these disorders has been a matter of controversy over many centuries within the scientific community and the community at large. Roffman and Stephens (2006) review the nature, consequences and treatment of cannabis

dependence. In this review, the controversy of a psychiatric diagnosis that is related to cannabis use is clearly demonstrated. Over time the very existence of cannabis dependence has been both vigorously asserted and robustly denied in the legislative hearings, books and articles in the popular literature, scientific writings and in the pronouncements of medical and legal experts (Roffman and Stephens 2006 p. 3). Many factors have influenced the perception of the existence of this disorder and these include political, social, religious and cultural factors and these factors continue to evolve over time and their influence also evolves.

In the early 1900s as cannabis use in the United States of America increased, American writers tended to see the drug as habit-forming while writers of the world where more potent forms were consumed perceived it as producing a physical addiction. The colourful and often frightening tales about the addiction liability of cannabis and its consequences have been told by various cultures and in various parts of the world including Africa. In the late 18th century, African White landowners were described as having intentionally addicted Bushmen at an early age to dagga to create an irresistible inducement for Bushmen to remain in landowner's service (Thompson 1967). In the mid-1800s, young Zulu warriors were described as being capable of accomplishing hazardous feats due to stimulation from dagga (Roffman and Sephens 2006 p. 6).

The current understanding of cannabinoid neurochemistry has made it possible to systematically study the effects of chronic exposure to cannabis. Relatedly, there is some evidence for the role of genetics in determining whether the cannabis user will

become dependent (Roffman and Stephens 2006 p. 14). While factors in an individual's social environment clearly influence whether he or she ever tries cannabis, becoming a heavy user or abuser may be more determined by genetically transmitted individual differences, perhaps involving the brain's reward system (Roffman and Stephens 2006 p. 15).

Controversy related to cannabis and psychiatric diagnosis is further demonstrated in the diagnosis of cannabis induced psychotic disorder as well as schizophrenia. Over the past few decades, there has been growing evidence for an association between regular cannabis use and psychotic symptoms and disorders, both in the general population and among incident cases of schizophrenia and other psychoses (Degenhardt and Hall 2006). This association prompts the question, "Is cannabis use a contributory cause of psychosis?" Degenhardt and Hall find it useful to distinguish 2 ways in which cannabis use could cause psychosis. The strongest hypothesis is that heavy cannabis use causes a psychosis that would not have occurred in the absence of cannabis. A second, weaker hypothesis is that cannabis use is a contributory cause in the sense that it may precipitate schizophrenia in individuals vulnerable to the illness. The second hypothesis assumes that cannabis use is one factor among many others (including genetic predisposition and other unknown causes) that act together to cause schizophrenia. These are not the only possible explanations of the association. It is possible that cannabis use and psychosis are caused by common factors that increase the risk of both, or that, individuals with schizophrenia use cannabis to self-medicate the symptoms of their disorder. Evidence of the association between cannabis use and psychosis, as well as evidence that chance is an unlikely

factor in this association is available (Degenhardt and Hall 2006). The difficulty lies in excluding the hypothesis that the relation between cannabis use and psychosis is due to other factors such as other drug use or genetic predisposition to develop schizophrenia and subsequently use cannabis to self-medicate (Degenhardt and Hall 2006).

In South Africa there is a firm belief among clinicians that a cannabis-related psychosis does exist and is common. Rottanburg et al (1982) conducted a study in Cape Town. In this study the mental state of 20 psychotic men with high urinary cannabinoid levels on admission to a psychiatric hospital was compared with that of 20 matched cannabis-free psychotic controls. All patients underwent toxicological analysis to exclude the presence of alcohol and other exogenous agents. The cannabis group showed significantly more hypomania and agitation and significantly less affective flattening, auditory hallucinations, incoherence of speech, and hysteria than did controls. Clouding of consciousness was absent in most cannabis patients. After 1 week the cannabis group showed marked improvement (particularly in the psychotic syndromes), whereas the controls remained virtually unchanged. There was no significant difference in the amount of medication received between the two groups. Rottanburg et al (1982) concludes that their data suggest that a high intake of cannabis may be related to a rapidly resolving psychosis manifesting with marked hypomanic features, though often presenting as a schizophrenia-like illness.

Numerous studies have identified frontal brain structural abnormalities in schizophrenia but there is little research that has been directed at understanding the

potential association between these abnormalities and cannabis use (Goldstein et al 1999; Gur et al 2000). Szeszko et al (2007) conducted a study at the Zucker Hillside Hospital in Glen Oaks, New York, on the anterior cingulate grey-matter deficits and cannabis use in first-episode schizophrenia. In their study they tested the hypothesis that patients with the dual diagnosis of schizophrenia and cannabis use disorder would have greater prefrontal structural abnormalities compared with patients who did not use cannabis and with healthy volunteers. This study revealed that patients experiencing a first episode of schizophrenia who have a history of cannabis use have less anterior cingulate grey matter compared with similar patients who do not use cannabis and with healthy volunteers (Szeszko et al). This may suggest that cannabis causes structural brain changes in patients with schizophrenia or patients with schizophrenia and structural brain changes are more likely to use cannabis.

2.3.2 Systemic Effects of Cannabis

Cannabis has effects on other systems in addition to the effects on the nervous system and these are reviewed by Ashton (2001). Cardiovascular effects include a dose-related tachycardia, vasodilation with associated reddening of the conjunctiva, and postural hypotension. Cannabis is carcinogenic to the pulmonary system. It is also associated with bronchitis and emphysema. Other systemic effects have been suggested but further studies are still required to ascertain their clinical significance. These include the immunosuppression, endocrine effects, and reproductive risks.

2.4   MEDICINAL USES OF CANNABIS

Cannabis and some of its preparations have been used for centuries by various communities throughout the world for medicinal or therapeutic benefits. The first formal report of cannabis as a medicine appeared in China nearly 5000 years ago when it was recommended for malaria, constipation, rheumatic pain and childbirth and, mixed with wine, as a surgical analgesia (Robson 2001).There are subsequent records of its use throughout Asia, the Middle East, Southern Africa and South America (Robson 2001). There have been many claims for the therapeutic efficacy of cannabis, and it is reputed to be used in a wide variety of traditional medicines in South Africa (Ames 1995).

Cannabis and the human brain have pharmacological properties that give hint to possible medicinal benefits of cannabis that require further scientific research. These include the discovery of THC which is an active compound of cannabis as well as the discovery of synthetic THC called dronabinol and the further discovery of nabilone, a synthetic THC analogue that has been licensed for prescription in the United Kingdom for nausea and vomiting caused by the cytotoxic chemotherapy unresponsive to conventional anti-emetics. There is also the presence of specific protein receptor for THC in the human brain which is CB1 as well as CB2 that is found outside the central nervous system. There is presence of the endogenous ligand called anandamide. Anandamide has analgesic and tranquillising effects in animals, is

involved in muscle coordination and affects the secretion of certain hormones (Robson 2001).

Therapeutic benefits have been noted in several conditions anecdotally or with some scientific validation in several conditions including nausea, vomiting, multiple sclerosis and other neurological conditions, loss of appetite and weight in cancer and AIDS patients, pain, asthma, epilepsy, raised intra-ocular pressure and others (Robson 2001). THC and nabilone are effective anti-emetics but there are no comparisons with 5-HT3 antagonists, so a role in modern anti-emetic regimes remains to be determined (Robson 2001). Cannabis and THC are effective appetite stimulants. Alongside anti-emetic, analgesic, anxiolytic, hypnotic and antipyretic properties this suggests a unique role in alleviating symptoms in selected patients with cancer or AIDS (Robson 2001). In 2006, regulatory officials authorized the first United States clinical trial investigating the efficacy of Sativex, an oral spray consisting of natural cannabis extracts, for the treatment of cancer pain. Sativex is currently available by prescription in Canada and on a limited basis in Spain and Great Britain for patients suffering from neuropathic pain, multiple sclerosis, and other conditions (Sadock and Sadock eds. 2007 p. 421).

Ware et al (2003) conducted a cross-sectional survey that provided data on the prevalence of cannabis use among an outpatient population of patients with chronic non-cancer pain in Canada. The results indicated that 35% of their sample of 220 patients who had ever used cannabis, 15% had used cannabis for pain relief, and 10% were currently using cannabis for pain relief purposes.

Limitations to the use of cannabis for medicinal purposes include the lack of research in efficacy in certain conditions, the lack of research in its effect on the immune system of patients with cancer and AIDS, suitable route of administration, potential for abuse, amongst others (Robson 2001).

In spite of these limitations, it is likely that people in South Africa with medical illnesses would use cannabis in an attempt to ameliorate or cure their illnesses. This volume of literature justifies a study like the current study, that will explore such use of cannabis. The literature on cannabis use for medicinal purposes is scarce in South Africa.

2.5 EPIDEMIOLOGY OF CANNABIS USE

2.5.1 General Population

Substance abuse is widespread in the community (Costa e Silva 2002). Cannabis is the most commonly used illicit drug in the United States and, by most estimates, around the world as well (Sadock and Sadock eds. 2007 p. 417). This prevalence of cannabis use has been confirmed in other parts of the world such as Europe and Australia in addition to the United States of America as revealed by the findings of the European Monitoring Centre for Drugs and Drug Addiction (2001) and

those of the Australian Institute of Health and Welfare (2002) that are reviewed by
Green et al (2005). Based on the 2003 National Surveys on Drug Use and Health
(NSDUH), an estimated 90.8 million adults (42.9%) aged 18 years or older in the
United States had used marijuana at least once in their life-time (Sadock and Sadock
eds. 2007 p. 417).

 The availability of epidemiological studies on cannabis, alcohol and other drug use
trends for the general population of South Africa is limited. Up to the time Stein et al
(2008) conducted a study on lifetime prevalence of psychiatric disorders in South
Africa, there was no nationally representative data available on the prevalence of
psychiatric disorders in South Africa. However, studies on specific groups such as
psychiatry and trauma patients as well as work done by the South African Community
Epidemiology Network on Drug Use (SACENDU) are available and do give some
insights into the epidemiology of cannabis use in South Africa. Parry et al (2002)
reviews the work done by SACENDU on drug use in the years from 1997 to 1999.
SACENDU was established in 1996 by the Medical Research Council of South Africa
(MRC) and the former University of Durban-Westville (currently merged with the
former University of Natal to form University of KwaZulu-Natal). SACENDU is a
network of researchers, practitioners and policy-makers from five sentinel sites in
South Africa. Three of the sites are large port cities (Cape Town, Durban and Port
Elizabeth) and two are provinces (Gauteng and Mpumalanga). Data is collected from
alcohol and other drug use treatment centres, from substance-abuse-related
admission/discharge diagnoses reported by acute psychiatric facilities as well as data

from trauma unit admission data collected via self-report measures and biological markers (breath alcohol measures and urine testing).

Alcohol is the most common primary drug of abuse across all sites. The demand for treatment of alcohol abuse, as a proportion of the total demand for substance abuse treatment, ranged from 55% to 74% in Durban. Across sites, cannabis alone or cannabis smoked together with Mandrax (known as a 'white pipe') is the second most common primary substance of abuse. Mandrax, also known as methaqualone, is a synthetic sedatve-hypnotic which acts as a central nervous system depressant. Although there have been no discernable trends in the treatment demand for cannabis abuse, marked geographic differences in the treatment demand for white pipe abuse have emerged, with the treatment demand being consistently highest in Port Elizabeth (ranging from 20% to 30% of total admissions) and Cape Town (accounting for 20% of the total treatment demand in Cape Town for 1999), while over time accounting for no more than 5% of total treatment demand in Gauteng. In Durban, treatment demand for white pipe-related problems decreased substantially in 1999, to less than 1% of the total treatment demand.

Across sites and over time consistently more males than females reported alcohol, cannabis and white pipes as their primary substances of abuse.
Cannabis is the most common illicit drug of use among patients treated in psychiatry inpatient units. From the second half of 1998, depending on the particular 6-month reporting period, 40–60% of psychiatric patients in Port Elizabeth reported the use of cannabis.

Mkize (2008) conducted a study to determine the prevalence of youth health risk behaviour among high school learners in and around Durban, South Africa. 12% of these high school learners admitted to have used cannabis in the past 30 day period. 3% of learners admitted to have used Mandrax in their lifetime and 2% of learners admitted to have mixed cannabis with Mandrax ("white pipe") in their lifetime.

Poulton et al(1997) conducted a study to determine change in patterns of cannabis use in New Zealand in an unselected birth cohort and to investigate the relationship between level of cannabis use, violent behaviour and employment history. In their sample, patterns of cannabis use were assessed at the ages 15, 18 and 21 years respectively. Levels of incidence, remission and stability were calculated from age 15 years. There was an increasing prevalence over this period. The incidence (new cases) and the likelihood of increase in use were more common than either remission or decrease in use. This was particularly so for men. Cannabis use and dependence were both significantly more associated with unemployment at the age of 21. It was unclear from their data if people used cannabis at greater rates when they are unemployed or whether high rates of cannabis use adversely affected an individual's ability to obtain employment.

2.5.2   Psychiatric Population

Mason (1999) studied a sample of seventy Zulu speaking males of ages between 18 and 30 who were floridly psychotic and had a history of cannabis use. These patients

were admitted at Fort Napier Hospital in the province of KwaZulu Natal, South Africa. At the time of the study, Fort Napier Hospital was responsible for admitting patients who were certified by a court. In her sample of 70 subjects 61.4% tested positive for urine cannabis on admission while 38.6% tested negative.

Solomons et al (1990) also investigated the use of cannabis among 100 Black African males admitted in a Johannesburg psychiatric hospital, South Africa. The majority of these patients were admitted through a certification by a court. The test for cannabinoids was positive in 29 cases (29%) of their sample of 100 cases.

Sembhi and Lee (1999) examined use of cannabis by psychotic patients admitted to an acute psychiatry admissions unit in Tokanui hospital, New Zealand. All acute admissions during a one month period aged 16 – 65 years were screened for psychosis. The patients' lifetime and recent use of cannabis and other substances was recorded in a brief questionnaire. A urine sample was taken, within 24 hours of admission, for laboratory drug analysis. Thirty nine patients were admitted in that one month period and urine drug screens were completed in thirty five patients. Eleven (31%) patients were positive for THC. There were no significant differences in demographic data between THC positive and THC negative groups.

Thirty (86%) of patients in Sembhi and Lee's (1999) study said that they had tried cannabis at least once. Urine THC positive patients were more likely to report using

cannabis most days, to have used more potent preparations of cannabis at some time and to have used other illicit substances. 31% of patients were positive for cannabinols on urine testing and that is lower than that found in South Africa by Rottanburg et al (1982) but it does suggest that cannabis use is prevalent in New Zealand's acute admission patients. Use of other drugs is rare.

Rolfe et al (1993) did a case control study to determine the association between psychosis and cannabis abuse in The Gambia and the importance of other risk factors. A group of psychotic patients admitted in a psychiatry hospital over a 12 month period were studied. A control group was recruited from friends and relatives visiting patients at a general medical and surgical referral centre. The control group was considered to be representative of the general population.

There were 259 admissions into the psychiatry hospital over a 12 month period and 210(90%) patients were available for analysis and were mostly African males. 80(38.1%) patients had positive tests for urinary cannabinoids. There were 76 men and 4 women. Of the 130 patients with a negative test, 60(29%) gave a history of past or recent use of cannabis. Of the 210 matched control subjects, 26(12.4%) had a positive test for urinary cannabinoids. Only 10(4.8%) out of the 210 control subjects admitted past or present cannabis use, of whom 3 had a positive urinary result.

Psychotic patients were 4.4 times more likely to have a positive cannabinoid result than matched non-psychotic controls and cannabis abuse pre-dated the onset of symptoms in most patients. A significant proportion (28%) of patients with a clinical

diagnosis of cannabis psychosis or intoxication gave a negative test for canabinoid substances. The authors concluded that the explanation for such results is that patients may have stopped using cannabis following the onset of psychotic symptoms; alternatively the test might have lacked the sensitivity or have been unable to detect psychoactive metabolites of locally grown cannabis.

There was a strong negative correlation between a positive urinary cannabinoid result and a family history of mental illness which provided convincing evidence that cannabis in the majority of patients was not merely unmasking latent schizophrenia. The results of this case control study demonstrated the strong association between the cannabis abuse and psychosis in West Africa. Two thirds of all psychiatric admissions had a history of past or recent use of cannabis.

2.5.3   Medical Patients

Patients who presented to the Accident and Emergency Unit at Addington Hospital from February to September 1992 were tested for the presence of urinary cannabis and alcohol levels were checked with a breathalyser (Hedden and Wannenburg 1994). Out of the sample of 530 cases, 29.4% were females and 70.6% were males. The results indicated that over half of the 530 cases had alcohol levels that were over the legal limit for driving a motor vehicle that was 0,08 mg/100ml at the time the study was conducted. Over a third were under the influence of cannabis and nearly one fifth were under the influence of both (Hedden and Wannenburg 1994).

2.5.4   Epidemiology of cannabis use – Conclusion

It is clear that literature from around the world supports the notion that cannabis use is common among the general population and South Africa is unlikely to be an exception. Cannabis use is common among psychiatric populations. An association between cannabis use and psychosis is supported by epidemiological literature. This epidemiological evidence provides support to researchers in South Africa to further explore the relationship between cannabis use and psychiatric illnesses.

Cannabis use is common among patients seen at the medical emergencies in South Africa. However, there is limited research on the epidemiology of cannabis use in patients who are hospitalised with severe medical illnesses. It is possible that patients who are seen at the emergency units are not necessarily chronic users of cannabis.

The present study is interesting as it further sheds some light on the association between cannabis use and psychiatric illnesses as well as medical illnesses.

2.6   CANNABIS AND THE LAW

The production, sale and possession of cannabis remains illegal in South Africa and this applies to many countries in the world. However, there has been a growing pressure in South Africa as well as in other Western countries for the reduction in the punitiveness of the laws concerning dagga either by decriminalisation, which is the removal of criminal penalties for possession, or outright legalisation, which will allow production and sale (MacCoun and Reuter 2001). Trade in dagga was first brought under international control in the International Opium Convention of 1925, largely at the insistence of the government of South Africa, when dagga quite wrongly came to be regarded in the same light as opium (Ncayiyana 2001). In 1961, the International single Convention on Narcotic Drugs was adopted in New York that sought to tighten the control on cannabis production and trade, and to bring an end within 25 years its non-medical use around the world (Ncayiyana 2001).

The tight control on cannabis is still maintained in South Africa in spite of the pressure to decriminalise cannabis. Ncayiyana (2001) is of the opinion that there is no rationale for the legal ban on dagga, the only beneficiaries of which are the drug dealers who profiteer from inflated underground prices. South Africa should decriminalise dagga use, and legalise possession of small amounts for personal consumption (Ncayiyana 2001).

It is asserted that careful, well-controlled studies of cannabis have been much hampered by legislation prohibiting its use and South Africa should follow countries

that have decriminalised cannabis for medical use (Ames 1995). Zabow (1995) cautions against decriminalisation of cannabis because of its well documented effects on humans. Cannabis is a potentially dangerous drug and as such a public health concern, especially with regard to the increased use evident in adolescents (Zabow 1995). Making cannabis fully legal is likely to increase its use substantially because of promotion, particularly in the USA with its peculiar dedication to commercial free speech; that is possibly undesirable (MacCoun and Reuter 2001).

The effects of cannabis on humans are discussed above and should influence debate on cannabis and the law. Over the past 13 years the legislation in South Africa on substances such as alcohol and tobacco has become stricter. There has been a substantial increase in taxation on these substances accompanied by legislation that controls use of tobacco in public places as well as control in advertising of tobacco and alcohol.

Use of alcohol while driving is controlled in South Africa as well as in many countries in the Western world. Such control in alcohol use while driving is based on the empirical evidence that clearly demonstrates that alcohol use impairs performance and increases the risk of collision involvement (Macdonald and Mann 1996).

Evidence on the effects of cannabis on collisions and traffic violations is likely to influence the debate on legalisation of cannabis. Macdonald et al (2004) conducted a study on collisions and traffic violations of alcohol, cannabis and cocaine abuse clients before and after treatment, in the Centre for Addiction and Mental Health in

Toronto, Canada. The objectives of this study were to determine whether clients in treatment for a primary problem of alcohol, cannabis or cocaine had significantly more traffic events (i.e. traffic violations and collisions) than a control group of licensed drivers; and to assess whether a significant reduction in traffic events occurs after treatment for each client group compared to a control group.

All three groups (i.e. alcohol, cannabis and cocaine abuse clients groups) had significantly more traffic violations than the control group. The results of this study demonstrated that cocaine and cannabis clients have a higher risk of traffic violations than matched controls and that reductions in collision risk was found after treatment for the alcohol and cocaine groups.

This study of Macdonald et al (2004) and related literature would need to be considered if use of cannabis were to be legalised. South Africa is overburdened by road traffic accidents. If cannabis use were to be legalised its control among motorists would have to be considered.

Parry et al (2005) conducted a study to assess the extent of cannabis and other drug use among patients presenting with recent injuries at trauma units in Cape Town, Port Elizabeth and Durban, South Africa, from1999 to 2001. The results showed that over half of all patients tested experienced a violent injury. Excluding opiates, across all sites and over time between 33% and 62% of their total sample of 1 565 patients, tested positive for at least one drug. In most cases the drugs were cannabis and / or

methaqualone. Opiates were excluded as some patients may have received morphine before arriving at the trauma unit.

Parry et al concluded from the results of their study that drug use among trauma patients has remained consistently high and efforts to combat the abuse of drugs such as cannabis and methaqualone would appear to be paramount in reducing the burden of injuries on health care services.

A case control study was conducted in France in order to determine the prevalence of alcohol, cannabinoids, opiates, cocaine metabolites, amphetamines and therapeutic psychoactive drugs in blood samples from drivers injured in road accidents and to compare these with those of a control population. This study demonstrated a higher prevalence of opiates, alcohol, cannabinoids and combination of these last two compounds in blood samples from drivers involved in road accidents than in those from controls, which suggests a causal role for these compounds in road crashes (Mura et al 2003).

In conclusion, legal issues relating to cannabis are of interest and are relevant to the current study. The fact that possession and use of cannabis remains illegal in South Africa may influence the patient's participation in the current study. Patients may be reluctant to participate in a study that investigates their use of an illegal substance. The results of the present study will add to the debate on decriminalisation of cannabis use and possession. The association between cannabis use and psychiatric

as well as medical illnesses is explored in the present study and the results obtained

will make a significant contribution to this legal debate.

CHAPTER 3

PATIENTS AND METHODS

3.1   AIM

To assess the association between cannabis use and psychiatric illnesses.

3.2   HYPOTHESIS

3.2.1   There is an association between the presence of urinary cannabinoids and a psychiatric diagnosis in psychiatric patients admitted to an acute admissions unit at King Edward VIII Hospital.

3.2.2   There is increased use of cannabis among psychiatry patients compared with medical patients, in other words cannabis increases the risk of mental illness.

3.2.3   Self-reporting of cannabis use is an acceptable screening tool to measure true cannabis use.

3.3   OBJECTIVES

3.3.1   To assess whether urinary cannabinoid level is associated with the psychiatric diagnosis and demographics in psychiatric patients admitted to an acute admissions unit at King Edward VIII Hospital.

3.3.2   To compare the cannabis use in psychiatric patients admitted to an acute admissions unit to patients admitted in a medical ward at King Edward VIII Hospital.

3.3.3   To assess the sensitivity, specificity, positive and negative predictive value of self-reported cannabis use against the gold standard of urinary cannabinoids measurement.

3.4   STUDY DESIGN

3.4.1 Study site and sample composition

This was a case-control study conducted at King Edward VIII Hospital, Durban.

All admissions to the psychiatry ward (A ward) at King Edward VIII Hospital in the period from 8th of October 2004 to the 23rd of December 2004 were screened for inclusion in this study. All psychiatry admissions at King Edward VIII Hospital are admitted in A ward. All these admissions are patients who require acute psychiatry care. The patients are admitted either as voluntary users or assisted users. The

patients that require involuntary care are transferred to Townhill Hospital, Pietermaritzburg. Other patients do get transferred to King George V Hospital which is another psychiatry hospital in the same complex of psychiatry units in Durban, if A ward gets full as it is a 20 bed unit.

The control group was selected from one medical ward where every consecutive patient admitted in the same period of the study was considered for inclusion in the study if they agreed to participate. The control subjects were excluded if they refused to participate, or they had a history of mental illness, or they could not give consent, or if they were young than age 18 years or older than age 65 years. There were 63 control subjects who participated in the study.

There was a total of 93 patients admitted to the psychiatry ward and 64 were included in the study. A minimum number of 63 was the targeted figure for this study for statistical purposes. The subjects selected for this study met the following inclusion criteria:

1. Admission to the psychiatry ward for more than 24 hours.
2. The subjects had to be able to give consent to the study within 2 weeks of admission.
3. Their age had to be from 18 years to 65 years.

A total of 29 patients were excluded from the study because of the exclusion criteria that comprised the following:

1. Subjects who were less than 18 years of age or who were older than 65 years.

2. Subjects who could not give consent or who refused to participate in the study.

3. Subjects who were transferred to another unit before they were eligible to participate in the study.

4. Subjects who were discharged from the ward in less than 24 hours.

Out of the 29 subjects that were excluded, 21 were excluded as they had been considered by their psychiatrists to be in need of involuntary care and were then transferred to Townhill Hospital. 1 subject did not give consent and 7 did not meet other criteria.

The investigator was not involved in the clinical management of the subjects and they all had their treating multidisciplinary psychiatric team. The investigator was personally involved in the selection of the subjects for this study.

3.4.2   Measurements

3.4.2.1   Demographic Questionnaire

The personal details, history of mental illness, psychiatric diagnosis, medical diagnosis, history of cannabis use, use of other substances and employment status were gathered into a questionnaire for both the case subjects and control subjects (Appendix D).

3.4.2.2   Cannabinoid 20 ng (THC2) Reagent

Urine was tested using the Cannabinoid 20 ng (THC2) Reagent. Cannabinoid 20 ng (THC2) Reagent, in conjunction with SYNCHRON Systems THC Urine Calibrators, is intended for the qualitative determination of cannabinoids in human urine on SYNCHRON LX Systems.

The Cannabinoid 20 ng assay provides a rapid screening procedure for determining the presence of cannabinoids in urine, using a 20 ng/mL cut off value. This test provides only a preliminary analytical result. A positive result by this assay should be confirmed by another generally accepted non-immunological method, such as thin layer chromatography (TLC), gas chromatography (GC), or gas chromatography/mass spectrometry (GC/MS). GC/MS is the preferred confirmatory method. Clinical consideration and professional judgement should be applied to any drug of abuse test result, particularly when preliminary positive results are used.

The results of the THC2 assay are qualitative results reported as either positive or negative. The qualitative result is based on comparison of the sample rate to the calibrated cut off rate. A sample result that is greater than or equal to the cut off rate is reported as positive. A positive result (> or = 20 ng/mL) from this assay indicates only the presence of cannabinoids and does not necessarily correlate with the extent of physiological and psychological effects. A negative test result indicates that cannabinoids are either not present, or are present at levels below the cut off threshold of the test.

The THC2 assay was chosen to measure urine cannabinoids for this study as it was readily available in the chemical laboratory of King Edward VIII Hospital and it is the test that is used for testing for cannabinoids at King Edward VIII Hospital when patients are tested for clinical reasons. A more specific test was considered and was thought not to be necessary for this study and the cost of such a test was also a limiting factor.

3.4.3   Data Collection

All patients admitted in the psychiatric ward during the study period were assessed personally by the investigator for the suitability to participate in the study using the inclusion and exclusion criteria. The informed consent was obtained and the subjects were given the information to participants leaflet in their own language (Appendix A,

B, and C). The investigator had more than one contact with the subjects for the purposes of obtaining an adequate consent. This was to ensure that the ability to give consent by psychotic patients was thoroughly assessed. In addition, the protocol of the study excluded patients who required involuntary care and could therefore not give consent. The protocol further allowed the researcher to wait up to two weeks before the consent was obtained. This would ensure that those patients who could still be psychotic had enough time to settle and give consent. The informed consent was obtained using the language of each patient being considered for the study. All patients considered for participation in this study were either fluent in IsiZulu or English and the investigator can speak both languages fluently and there was no need for an interpreter. The study was designed such that there was only one contact intended for the study after the consent had been obtained.

All those subjects selected for the study were assessed by the investigator and the necessary information such as demographic data was obtained from the subjects and their hospital files using a questionnaire (Appendix D). Urine was voluntarily voided by the subjects into the urine specimen bottles. These specimen bottles were personally delivered to the laboratory by the investigator and were handed to the laboratory technicians who signed and processed the specimen for the purposes of this study.

3.4.4 Statistical Methodology

SPSS version 15.0 (SPSS Inc., Chicago, Illinois, USA) was used to analyse the data. Bivariate associations between risk factors and case/control status were

analysed using Pearson's chi square test. Statistical significance level was set at

0.05. All variables that were significantly associated with case/control status plus

gender which could have been a confounder, were used in a multivariate logistic

regression model to identify the independent effects of these variables after

controlling for confounding. A backwards elimination technique was used with

entry and exit probabilities set at 0.05 and 0.1 respectively.

Self reported cannabis use was assessed against the gold standard of objective

cannabis testing. Sensitivity, specificity, positive and negative predictive values and

their 95% Confidence intervals were calculated using EpiCalc 2000, version 1.02 (Joe

Gilman and Mark Myatt, Brixton Books 1998).

3.5   ETHICS

Ethical consideration and approval was obtained from the ethics committee of the

University of KwaZulu-Natal. The permission to conduct the study in the wards of

King Edward VIII Hospital was also obtained from the Chief Executive Officer of the

hospital. Consent procedures were explained to all participants in their mother

tongue. Consent was obtained from both the case subjects and control subjects and

the explanation and the manner in which it was obtained was the same. IsiZulu was

the predominant language spoken by the subjects and a few subjects spoke English.

The investigator is fluent in both languages. The investigator explained the procedure

in the presence of a witness. The witnesses were also fluent in both languages. The

subjects were also given a written information leaflet in the language of their preference to keep and read for at least 24 hours before a written consent was signed (Appendix B and C).

The urine collection involved the voluntary voiding of urine by the subject. There was no use of any invasive procedures. There was no interference in the clinical management of the patients by the investigator. All clinical decisions were made by the multidisciplinary psychiatric team. These decisions included the decisions about hospitalisation of patients, their length of stay in hospital, transfers to other units, choice of medications and others. The participation in the study was voluntary and confidential. The patients were given an option to request their results of the cannabis test. Counselling and further management of patients for substance related disorders was offered if it was requested.

There were no subjects who participated in the study who later requested their results. The researcher did not disclose the results to the multidisciplinary teams treating these subjects or to the subjects. Handling of these results that are of a treatable problem poses an ethical dilemma. However, it would have caused more damage to research ethics if the researcher had disclosed the results of urinary cannabinoids to the multidisciplinary teams without the consent of the research subjects as the consent was designed to protect the subjects from any biased treatment they would obtain from the multidisciplinary teams. The researcher is of the opinion that the multidisciplinary team in A ward, King Edward VIII Hospital has

experienced psychiatrists who would be able to detect if their patients had a cannabis

related problem and do a urinary cannabinoid test for clinical purposes.

CHAPTER 4

RESULTS

4.1   SAMPLE DETAILS

There were 93 subjects who were admitted in A ward at King Edward VIII Hospital in the period of this study (i.e. 18th of October 2004 to the 23rd of December 2004) and they were all assessed for participation in the study. 29 subjects were excluded because of exclusion criteria. 21 subjects were floridly psychotic and were transferred to Townhill hospital in Pietermaritzburg as certified patients. 7 subjects were found not suitable to give consent or could not fulfil other inclusion criteria while 1 subject refused to give consent. There were 64 subjects therefore who participated in the study after the exclusions and there were 63 control subjects. The ratio of the control subjects to study subjects (cases) was deemed appropriate as it provided a statistical power of 94%.

4.2   DEMOGRAPHICS

The demographic data was obtained from the subjects as well as from their files using the demographic questionnaire (Appendix D). The information was not verified with the family or relatives of the subjects. The study group and the control group were not matched for demographic variables such as the age, gender and employment.

Table I

The demographic variables of the study and control groups

		group				p value
		control		study		
		Count	Column %	Count	Column %	
AGE GROUP	15-20 years	5	7.9%	7	10.9%	0.364
	21-30 years	17	27.0%	24	37.5%	
	31-40 years	23	36.5%	23	35.9%	
	41-50 years	10	15.9%	7	10.9%	
	51-60 years	8	12.7%	3	4.7%	
SEX	male	41	65.1%	42	65.6%	0.948
	female	22	34.9%	22	34.4%	
EMPLOYMENT	Employed	21	33.3%	11	17.2%	0.101
	Unemployed	36	57.1%	48	75.0%	
	Scholar	6	9.5%	4	6.3%	
	Tertiary student	0	.0%	1	1.6%	
EMPLOYMENT CATEGORY	formal	17	27.0%	8	12.5%	0.098
	informal	4	6.3%	3	4.7%	
	unemployed	42	66.7%	53	82.8%	

There were no significant differences between the study group and control group in terms of the demographic variables, thus the groups were comparable.

4.2.1 Age

The subjects were categorised into the following age groups:

18 – 20 years; 21 – 30 years; 31 – 40 years; 41 – 50 years; 51 – 60 years as part of

the protocol of this study (appendix D; fig. 1 p 42; table I p. 41).The youngest age of

the participants in this study was 18 years of age.
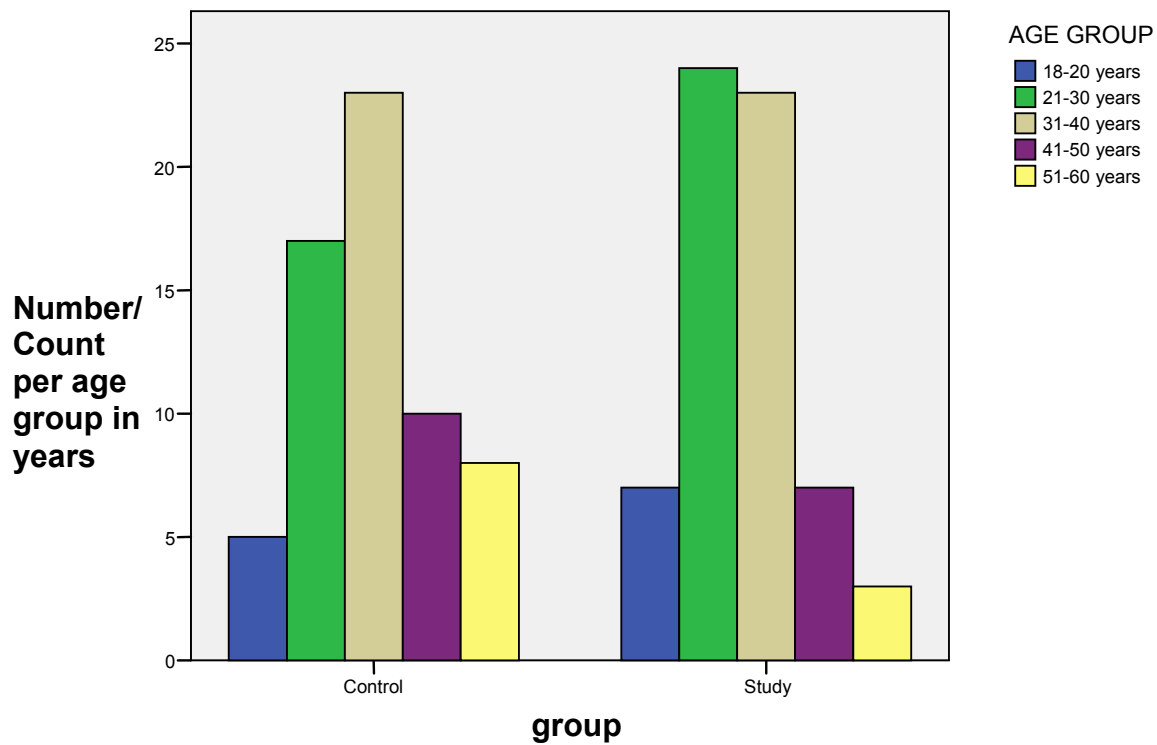
Figure 1

Age groups of subjects

Most subjects in both the study group and the control group were in the 21 – 30 years
and the 31 – 40 years age groups (fig. 1 p. 42; table I p. 41). In the 21-30 years age
group there were 24(37.5%) subjects of the study group and there were 17(27.0%)
control subjects (table I p. 41). In the 31-40 years age group there 23(25.9%) subjects
of the study group and there were 23(36.5%) control subjects (table I p. 41). There
was no significant difference between the age groups of the study group and the
controls and this is verified by the p value of 0.364 (table I p. 41). Most subjects who
tested positive for urinary cannabinoids were in the 21-30 years age group and the
31-40 years age group (table II p.43).

Table II

Age groups of all subjects and urine cannabis

AGE GROUP		cannabis		Total
		negative	positive	
18-20 years	Count	9	3	12
	% within AGE GROUP	75.0%	25.0%	100.0%
21-30 years	Count	34	7	41
	% within AGE GROUP	82.9%	17.1%	100.0%
31-40 years	Count	39	7	46
	% within AGE GROUP	84.8%	15.2%	100.0%
41-50 years	Count	15	2	17
	% within AGE GROUP	88.2%	11.8%	100.0%
51-60 years	Count	11	0	11
	% within AGE GROUP	100.0%	.0%	100.0%
Total	Count	108	19	127
	% within AGE GROUP	85.0%	15.0%	100.0%

4.2.2 Gender

The study group was composed of 42 males (65.6%) and 22 females (34.4%). The control group was composed of 41 males (65.1%) and 22 females (34.9%) (figure 2 p. 44). There was therefore no significant difference in the gender composition of the two groups (p value = 0.948) (table I p. 41).
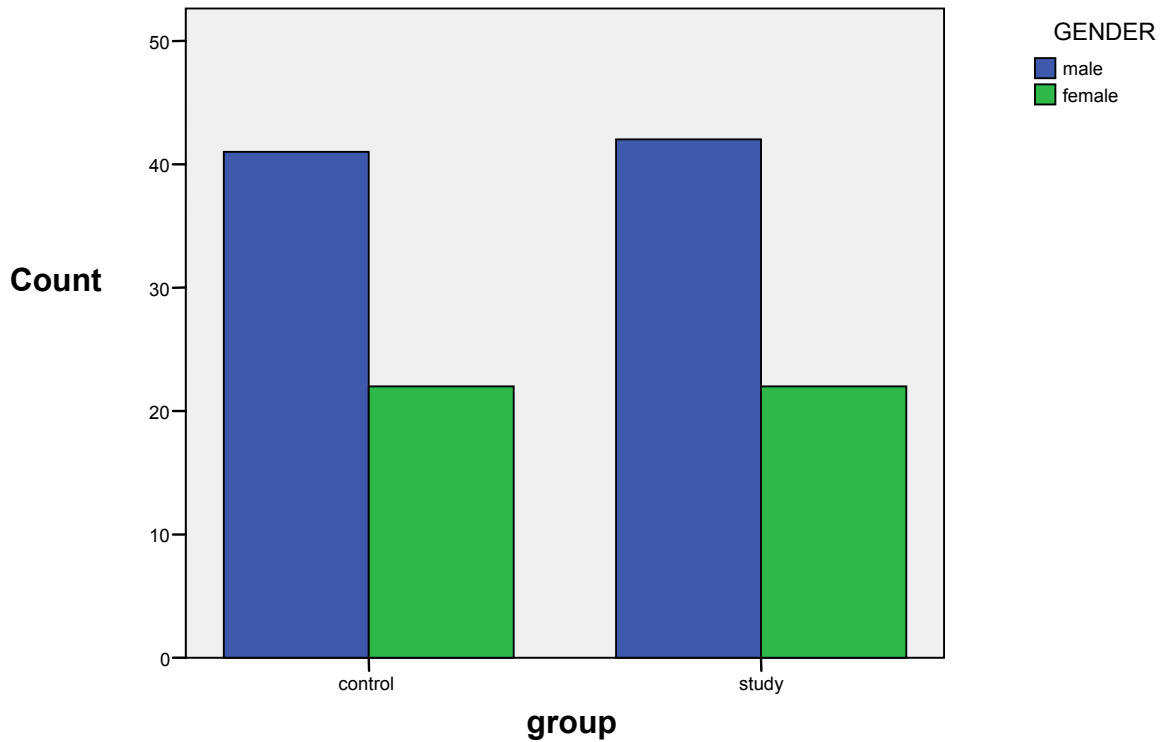
Figure 2

Gender of Subjects

4.2.3 Employment

The subjects in both the study group and the control group had their employment

status categorised into the following groups: employed, unemployed, scholar, tertiary

student (Appendix A). Scholar referred to any subject who was still attending school

from grade 1 up to grade 12. The above categories were chosen using the

experience of the investigator in the demographics of patients usually admitted in the

psychiatry ward at King Edward VIII Hospital (table I p. 41; fig 3 p. 46).

Those who were employed were further subdivided into those who were in formal

employment and those who were in informal employment.

48 subjects (75.0%) in the study group and 36 subjects (57.1%) in the control group

were unemployed. Although there were more subjects who were unemployed in the

study group than the control group, this was not statistically significant when all the

employment categories between the two groups were compared as revealed by the

p value of 0.101 (table I p. 41). In both groups the majority of those employed were in

the formal employment category. However, this was of no statistical significance

(p value = 0.098) (table I p. 41).
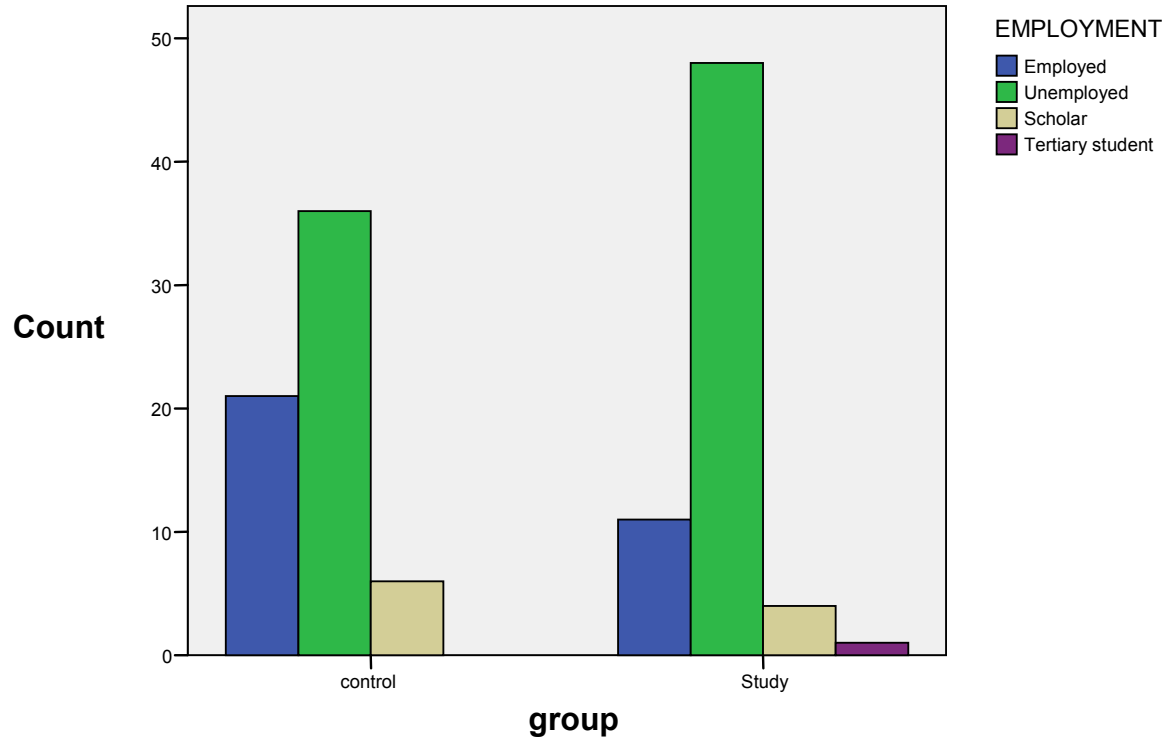
Figure 3

Employment Categories

4.3   OBJECTIVES – RESULTS

4.3.1 Objective 1: To assess whether urinary cannabinoid level is associated with the psychiatric diagnosis and demographics in psychiatric patients admitted to an acute admissions unit at King Edward VIII Hospital**.**

The study subjects had the following psychiatric diagnosis:

Schizophrenia, other psychotic disorders, substance related disorders, bipolar disorder, major depressive disorder, mental retardation and neuroleptic dyskinesia (table III p. 48; fig. 4 p. 49).

27 subjects (42.2%) in the study group had schizophrenia and 18 subjects (28.1%) had other psychotic disorders. This means that 70.3% of the subjects in the study group had a psychotic disorder. 7 subjects (10.9%) in the study group were admitted with a diagnosis of a substance related disorder, 10 subjects (15.6%) had a mood disorder (table III p.48; fig.4 p.49). 1 subject had mental retardation and 1 subject had neuroleptic dyskinesia (table III p. 48; fig. 4 p. 49). There was no significant association between diagnosis and urinary cannabis (p=0.454), however the results of the test should be interpreted with caution since 64.3% of the cells had expected counts of less than 5, thus the assumptions of the test were violated and the test is invalid. Thus the trends should be examined rather than the statistical significance. The diagnosis most associated with cannabis use was substance related disorder

(57.1% tested positive for cannabis use). The other diagnoses were not statistically associated with cannabis use.

Table III
Psychiatric diagnosis and urinary cannabis results

PSYCHIATRY DIAGNOSIS CATEGORY		cannabis		Total
		negative	positive	
Schizophrenia	Count	21	6	27
	% within Psychiatry diagnosis category	77.8%	22.2%	100.0%
Other psychotic disorders	Count	13	5	18
	% within Psychiatry diagnosis category	72.2%	27.8%	100.0%
Substance related disorders	Count	3	4	7
	% within Psychiatry diagnosis category	42.9%	57.1%	100.0%
Bipolar disorder	Count	7	1	8
	% within Psychiatry diagnosis category	87.5%	12.5%	100.0%
Major depressive disorder	Count	1	1	2
	% within Psychiatry diagnosis category	50.0%	50.0%	100.0%
Mental retardation	Count	1	0	1
	% within Psychiatry diagnosis category	100.0%	.0%	100.0%
Neuroleptic dyskinesia	Count	1	0	1
	% within Psychiatry diagnosis category	100.0%	.0%	100.0%
Total	Count	47	17	64
	% within Psychiatry diagnosis category	73.4%	26.6%	100.0%

Pearson chi square =5.728, p=0.454
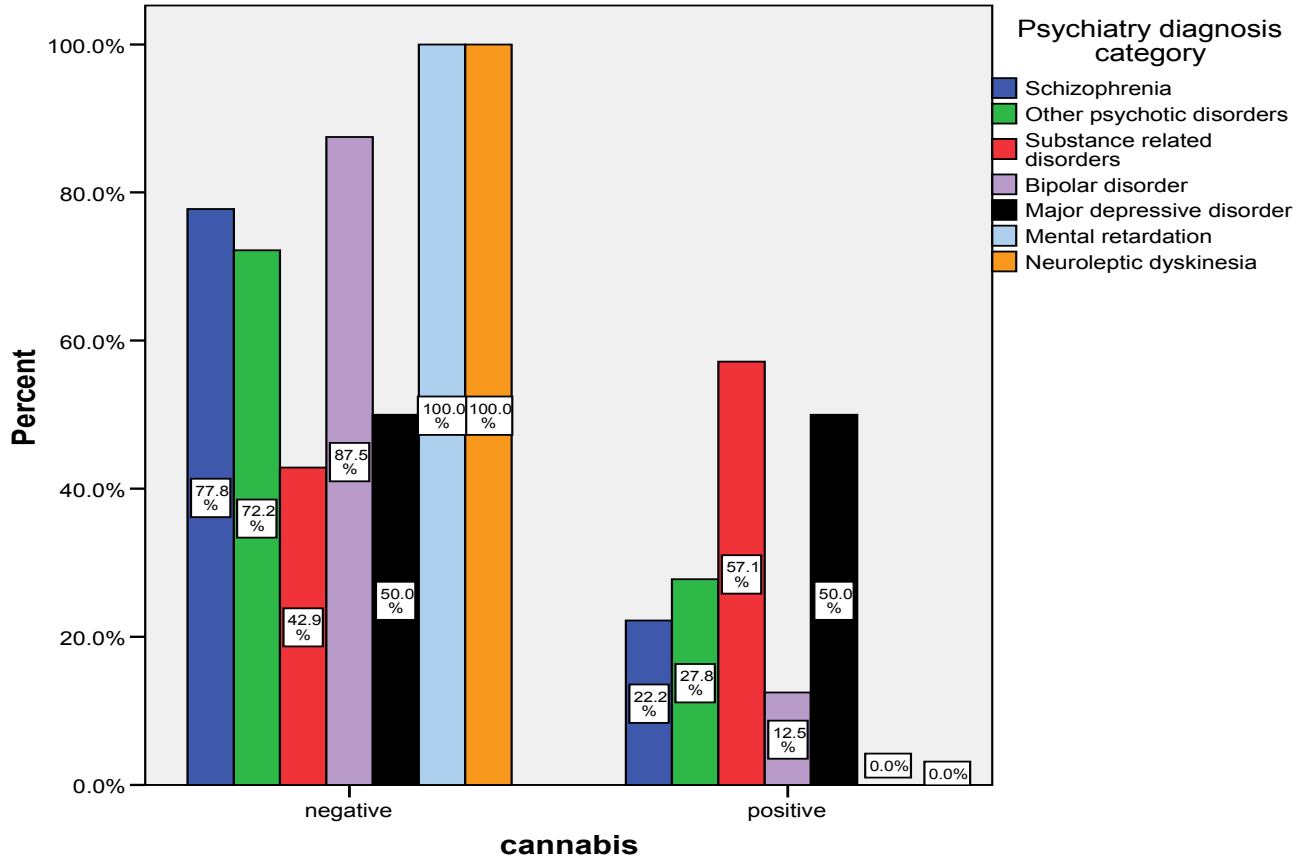
Figure 4

Psychiatric Diagnosis of the Study Group by cannabis use (n = 64)

There was no age group that was significantly associated with positive urinary

cannabinoid results (p = 0.530) (table IV p. 50). However, most of the subjects who

tested positive for urinary cannabinoids were in the 21 – 30 and 31 – 40 age groups

(14 out of 19 subjects, which is equal to 73.7%). However 14(16.1%) subjects are a

small percentage when compared to the total number of subjects who were in this

age group which is 87(100%). This therefore results in insignificant association when

each age group is compared with the urinary cannabinoid result.

Table IV
Age group and urinary cannabinoid results

			cannabis		Total
			negative	positive	
AGE GROUP	15-20 years	Count	9	3	12
		% within AGE GROUP	75.0%	25.0%	100.0%
	21-30 years	Count	34	7	41
		% within AGE GROUP	82.9%	17.1%	100.0%
	31-40 years	Count	39	7	46
		% within AGE GROUP	84.8%	15.2%	100.0%
	41-50 years	Count	15	2	17
		% within AGE GROUP	88.2%	11.8%	100.0%
	51-60 years	Count	11	0	11
		% within AGE GROUP	100.0%	.0%	100.0%
Total		Count	108	19	127
		% within AGE GROUP	85.0%	15.0%	100.0%

P = 0.530

Most subjects who tested positive for urinary cannabinoids were of the male gender

and the association between male gender and a positive urinary cannabinoid result

was of statistical significance as revealed by a p value of 0.004.

Table V
Sex and urinary cannabinoid results

			cannabis		
			negative	positive	Total
SEX	male	Count	65	18	83
		% within SEX	78.3%	21.7%	100.0%
	female	Count	43	1	44
		% within SEX	97.7%	2.3%	100.0%
Total		Count	108	19	127
		% within SEX	85.0%	15.0%	100.0%

P = 0.004

There was a significant association between unemployment and a positive urinary

cannabinoid result (p = 0.006) (table VI p. 51).

Table VI
Employment and urinary cannabinoid results

			cannabis		
			negative	positive	Total
employ	employed	Count	32	0	32
		% within employ	100.0%	.0%	100.0%
	unemployed	Count	76	19	95
		% within employ	80.0%	20.0%	100.0%
Total		Count	108	19	127
		% within employ	85.0%	15.0%	100.0%

P = 0.006

The presence or absence of a psychiatric history was obtained from the case subjects. The control subjects were not entered into the study if they had a history of psychiatric illness. 40 of the case subjects (62.5%) had past psychiatric history (table IV p. 50). There was no significant association between the presence or absence past psychiatric history and a positive urinary cannabinoid result (table VIII p. 52).

Table VII

Past psychiatric history

	Frequency	Percent
yes	40	62.5
no	24	37.5
Total	64	100.0

Table VIII
Past psychiatric history and urinary cannabinoid results

			cannabis		Total
			negative	positive	
PAST PSYCHIATRIC HISTORY	yes	Count	32	8	40
		% within PAST PSYCHIATRIC HISTORY	80.0%	20.0%	100.0%
	no	Count	76	11	87
		% within PAST PSYCHIATRIC HISTORY	87.4%	12.6%	100.0%
Total		Count	108	19	127
		% within PAST PSYCHIATRIC HISTORY	85.0%	15.0%	100.0%

P = 0.280

4.3.2 **Objective 2:** To compare the cannabis use in psychiatric patients admitted to an acute admissions unit to patients admitted in a medical ward at King Edward VIII Hospital.

4.3.2.1 Urinary cannabinoids

17 subjects (26.6%) in the study group tested positive for the urinary cannabinoids and 2 subjects (3.2%) in the control subjects tested positive. There was a highly statistically significant association between group (case/study vs. control) and cannabis use measured by urinary cannabinoids (p<0.001) (table IX p.53).

Table IX
Urinary cannabis results versus group

			group		Total
			control	study	control
cannabis	Negative	Count	61	47	108
		% within group	96.8%	73.4%	85.0%
	Positive	Count	2	17	19
		% within group	3.2%	26.6%	15.0%
Total		Count	63	64	127
		% within group	100.0%	100.0%	100.0%

Pearson's chi square = 13.65, p<0.001
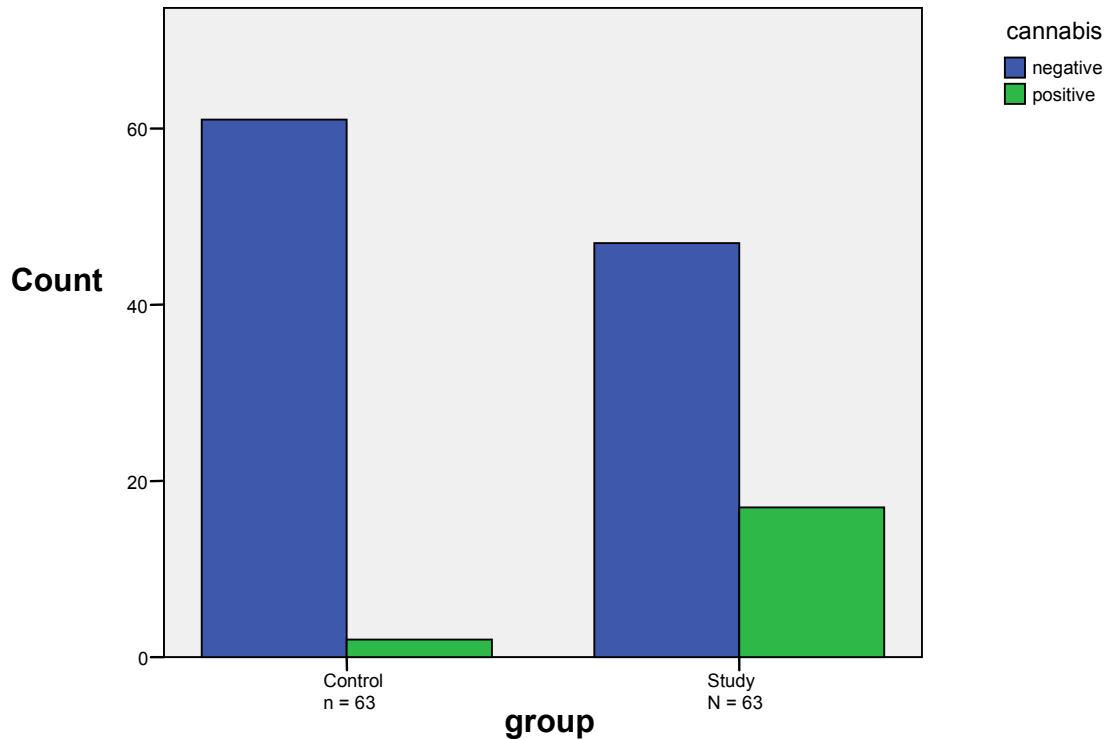
Figure 5

Urine cannabis results by group

4.3.2.2 Self-reported cannabis use

There was a significant association between self reported cannabis use and group (p=0.013). 10.9% of the study subjects admitted to using cannabis, while none of the controls admitted (table X p. 55).

Table X
Self reported Cannabis use versus group

			group		Total
			control	study	control
Self reported Cannabis use	No	Count	63	57	120
		% within group	100.0%	89.1%	94.5%
	Yes	Count	0	7	7
		% within group	.0%	10.9%	5.5%
Total		Count	63	64	127
		% within group	100.0%	100.0%	100.0%

Fisher's exact p =0.013

Urinary cannabis was used as the independent variable of interest in further analysis since it is the gold standard of cannabis measurement. Logistic regression analysis was performed to assess the association between cannabis use and group (case/study or control) whilst controlling for demographic variables which may also be associated with cannabis use.

Backwards stepwise method of model selection based in likelihood ratios revealed after four steps that urine cannabis was the only variable significantly associated with group (Odds Ratio 11.032, p=0.002) (table XI p. 56). Therefore those testing positive for cannabis were 11 times more likely to be psychiatric patients than medical patients.

Table XI
Binary logistic regression analysis for psychiatric patients (study group) vs medical patients (control group).

Variables in the Equation

		p value	Odds Ratio	95.0% C.I.for Odds ratio	
				Lower	Upper
Step 4(a)	cannabis(1)	0.002	11.032	2.428	50.126
	Constant	0.179	0.770		

a Variable(s) entered on step 1: AGEGROUP, SEX, employ, cannabis.

4.3.3 Objective 3: To assess the sensitivity, specificity, positive and negative predictive value of self-reported cannabis use against the gold standard of urinary cannabinoids measurement.

Table IX shows that self reporting of cannabis use vs the gold standard (i.e urinary cannabinoid measurement) had poor sensitivity (21%) whilst the specificity was high (97%). This means that self reporting of cannabis use missed a high percentage of truly positive cases. Thus the percentage of false negatives was unacceptably high. The high specificity means that a negative self reporting of cannabis use (i.e subjects who denied cannabis use) was a good indicator of a negative gold standard test (i.e negative urinary cannabinoid result) and thus there were few false positives. The low positive predictive value is influenced by the low prevalence of cannabis use in the sample, and indicated that only 57% of self report positives were truly positive. The negative predictive value was relatively high (88%).

Table XII

Self reported Cannabis use vs urinary cannabinoid results

		cannabis		Total
		negative	positive	negative
Self reported Cannabis use	No	105	15	120
	Yes	3	4	7
Total		108	19	127

```
Screening [95% CI]
Prevalence                          :       0.15      [0.09, 0.23]
Sensitivity                         :       0.21      [0.07, 0.46]
Specificity                         :       0.97      [0.91, 0.99]
Accuracy                            :       0.86      [0.78, 0.91]
Predictive value of +ve result     :       0.57      [0.20, 0.88]
Predictive value of -ve result     :       0.88      [0.80, 0.93]
```

4.4 USE OF OTHER SUBSTANCES

The information on the use of cannabis and other substances was obtained from the subjects. There was an intention to obtain the history of the presence of substance abuse before the onset of the illness from the guardians of the subjects in the study group. This was unfortunately abandoned at the beginning of the study as in most cases the guardians were not available. It would have also increased the costs of doing the study if the guardians were requested to come to the hospital specifically for the purposes of this study. The use of other substance was not quantified as whether it was more than social or not. This means that the results of this study depict any use of substances irrespective of quantity.

21 subjects (32.8%) of the study group admitted to have used other substances and in the control group there were 9 subjects (14.3%) who admitted such use (table XIII p. 59).

Table XIII

Self reported use of other substances

GROUP		Other substances		Total
		nil	other	
control	Count	54	9	63
	% within group	85.7%	14.3%	100.0%
study	Count	43	21	64
	% within group	67.2%	32.8%	100.0%
Total	Count	97	30	127
	% within group	76.4%	23.6%	100.0%

CHAPTER 5

DISCUSSION OF RESULTS

5.1   SAMPLE DETAILS

The composition of the study group and the control group was similar with regards to the gender, age and the total number of cases included and the two groups were not matched for these demographic variables (table I p.41).

5.2   DEMOGRAPHIC DATA AND THE ASSOCIATION WITH A POSITIVE URINARY CANNABINNOID RESULT

5.2.1 Age

There was no significant difference in the age composition of the study group when compared with the control group (p = 0.364) (table I p.41). Most of the subjects included in this study for both the study group and the control group were in the 21-30 and the 31-40 age groups. For the study group this is explained by the fact that most of the subjects had a psychotic disorder and some had substance related disorder. Research has shown that the onset of psychotic disorders, especially schizophrenia, is commonly in this age group. Substance abuse also commonly afflicts these age

groups. However, this study did not find a significant association between a positive urinary cannabinoid result and age group.

The higher number of subjects in the similar age group (i.e. 21-30 years and 31-40years) in the control group that was composed of exclusively medically ill patients can be explained by the presence of medical illnesses such as HIV epidemic in South Africa that also afflict young adults.

Out of the 19 subjects who tested positive for urinary cannabinoids (this figure includes both the case and control subjects) only 2 were in the 41-50 age group and there was no subject who tested positive for urinary cannabinoids in the 51-60 age group. Studies on cannabis that have had no age restriction in their inclusion criteria such as that of Rottanburg et al. (1982) and that of Solomons et al. (1990) have shown that cannabis abuse among psychotic patients was common among patients who were in their twenties. The present study confirms such findings although this is not statistically significant. However these results cannot be compared with those of the study done by Mason (1999, unpublished) as the inclusion criteria in her study had an age restriction of 18-30 years.

5.2.2 Gender

There was no significant gender difference between the study group and the control group ($p = 0.948$) (table I p. 41). Both groups had two thirds of their composition being

the male gender. Such a high percentage of male patients is expected to be found in an acute admissions unit in which most patients were acutely psychotic. There was a significant association between a positive urinary cannabinoid result and a male gender (p = 0.004) (table V p. 51). This finding confirms research findings including the work of SACENDU that assert that males are more likely to be afflicted by substance abuse than females (Parry et al 2002). Rolfe et al (1993) in their study conducted among psychiatry patients established that 80 (38.1%) patients (76 men and 4 women) out of 210 patients tested positive for urinary cannabinoids. There were 185 men and 25 women included in this study

5.2.3 Employment

All subjects who tested positive for urinary cannabinoids were unemployed. The association between schizophrenia and the decline in the occupational and academic functioning is well established in the psychiatry literature. There are studies that have looked at such decline in association with cannabis use. In a study conducted in a non-Western society of South Taiwan it was established that the risk of substance use disorders was greater in boys and in adolescents with academic underachievement (Gau et al 2007). However the researcher of this study admits that this study was unable to assess the predictive role of substance use disorders for poor academic achievement.

5.3   URINARY CANNABINOID RESULTS AND THE ASSOCIATION WITH THE PSYCHIATRIC AND MEDICAL DIAGNOSIS

The majority of study group subjects (70.3%) in this study had a psychotic disorder. This is in keeping with the normal trends of patients admitted in the psychiatry ward at King Edward VIII Hospital. A further 10.9% of subjects had a substance related disorder. It is difficult to compare the urinary cannabinoid results between the patients who had a psychotic disorder versus those who had other non psychotic psychiatric disorder as the patients who had other non psychotic psychiatric disorders (excluding substance related disorders) were only 18.8%.

With the exception of the diagnostic category of substance related disorders, the results of the current study did not reveal a diagnostic category that is significantly associated with a positive result on urinary cannabinoid testing. However, trends in the results of this study are of clinical significance. Out of the 45 subjects who had schizophrenia or other psychotic disorder 11 (24.4%) tested positive on urinary cannabinoid testing. Further, there were 17 subjects among the study group subjects who tested positive for urinary cannabinoids. This means therefore that out of those 17 subjects who tested positive for urinary cannabinoids, 11 (64.7%) had a psychotic disorder (schizophrenia or other psychotic disorder) and this excludes the subjects who had a substance related disorder (Table III p. 48). Rolfe et al (1993) in their study found that 38% of psychotic patients tested positive for urinary cannabinoids when compared with 12% of matched non psychotic patients.

The commonest psychotic disorder among the study group subjects who had a psychotic disorder was schizophrenia as 6 (54.5%) out of 11 case subjects had a specific diagnosis of schizophrenia. The relationship between cannabis use and schizophrenia has been explored in several studies. Most of the hospital based studies that were reviewed involved psychotic patients and schizophrenia being the commonest diagnosis.

Veen et al (2004) conducted a study on cannabis use and age at onset of schizophrenia. The objective of their study was to assess the independent influences of gender and cannabis use on milestones of early course of schizophrenia in a Dutch population-based incidence cohort of patients with schizophrenia. Male gender was found to be a predictor of an earlier age at onset of social and/or occupational dysfunction and of a higher risk of developing negative symptoms before first contact with a physician for treatment. The salient finding, however, was that cannabis use was a much stronger predictor than gender of age at first psychotic episode. In male patients there was a 7-year age difference between the users and nonusers of cannabis.

Veen et al (2004) postulate that there are at least three mechanisms that could explain the relationship between cannabis use and earlier age at psychosis onset in males. These mechanisms are not mutually exclusive, and one can raise several arguments for and against the plausibility of each mechanism. First, it is possible that cannabis has no influence on risk or age at onset and that, younger patients,

compared with older patients, are more likely to use cannabis before the first psychotic episode because the use is age related. However, the prevalence of cannabis use in the Dutch general population was substantially lower than in their incidence cohort.

A second possibility is that cannabis hastens the onset of psychosis in subjects who would have also developed the disorder if they had never used this substance. This possibility is supported by the observation that cannabis may trigger or exacerbate psychotic symptoms in healthy subjects and in schizophrenia patients. However, there is no definitive evidence for a decreasing age at onset of schizophrenia nor for an increasing gender difference in this respect.

Thirdly, it is possible that cannabis results in the manifestation of schizophrenia in young subjects who are genetically at risk for developing the disorder. According to this point of view, some of these individuals would never have developed schizophrenia had they not used cannabis. This mechanism could account for a higher schizophrenia risk for males, because cannabis is more commonly used by males.

It is possible that all three mechanisms are relevant. The association between cannabis use and a psychotic disorder is established in the present study and the mechanisms discussed by Veen et al (2004) could explain this association. However, the present study does not prove any causal relation between cannabis use and psychosis.

Barnes et al (2006) in their study on co morbid substance use and age at onset of schizophrenia also found out that cannabis use and gender had independent effects on age at onset of psychosis, after adjusting for alcohol misuse and use of other drugs.

Negrete et al(1986) in their clinical survey that examined the effect of cannabis on schizophrenic symptoms, established that cannabis affects the severity of schizophrenic symptoms. Subjects who were using cannabis during the observation period of their study presented with a significantly higher degree of delusional and hallucinatory activity than those who did not. Moreover, the group using cannabis made a higher average number of visits to the hospital during the same period.

The medical diagnoses among the case subjects were not statistically analysed. Taken as a group there was no relationship between cannabis use revealed through self reporting or urinary cannabinoid testing and the medical diagnosis.

5.4   URINARY CANNABINOID RESULTS: PSYCHIATRIC PATIENTS VERSUS MEDICAL PATIENTS

There is a significantly higher prevalence of subjects who tested positive for urinary cannabinoids amongst the study group when compared with the control group as the present study found a prevalence of 26.6% in the study group and 3.2% in the control group ($p<0.001$). There is a significant association between a positive urinary

cannabinoid result and being a psychiatry patient as subjects who tested positive for urinary cannabinoids were 11 times more likely to be psychiatric patients then be medical patients.

There are not many studies in South Africa on the prevalence of cannabis use in the general population. It is therefore difficult to compare the prevalence of cannabis use in this study with the general population of South Africa. There are countries in the world in which the prevalence of cannabis use in their general populations is well established. The findings of the current study revealed a higher prevalence of cannabis use among the study group subjects when compared with the prevalence of cannabis use in the general populations of those countries. Over 40% of the population of New Zealand, aged 45 years and younger, have used cannabis at some time in their life (Black and Casswell 1991). This prevalence is higher than that found among learners in and around Durban, South Africa (Mkize 2008).

The prevalence of the study group subjects testing positive for urinary cannabinoids, though slightly lower, is in keeping with that found by Rottanburg et al (1982), Solomons et al (1990) and Sembhi and Lee (1990). Rottanburg et al and Solomons et al conducted their studies in South Africa and they found a prevalence of 30% and 29% respectively while the study of Sembhi and Lee was done in New Zealand and found the prevalence of 31%.

The prevalence of subjects of the study group with positive urinary cannabinoids in the current study is significantly lower than that found by Mason (1999) which was 61.4%. Mason had done her study in the same province of South Africa as the

present study and one would have expected a similar prevalence. There are however, significant differences in the characteristics of the sample of the study group of this study and the characteristics of the sample that was studied by Mason and these differences could account for the incidence of subjects testing positive for urinary cannabinoids in the present study being almost half of that found by Mason.

Mason's sample was composed of males who were floridly psychotic and certified by a court of law to Fort Napier Hospital. In the current study, about a third of patients assessed for participation in the study were excluded. The reason for their exclusion in the majority of those who were excluded was because they were certified to Townhill Hospital. It is likely therefore that the majority of those patients who were excluded would have tested positive for urinary cannabinoids, in keeping with Mason's findings.

Another reason that could account for such a significant difference between this study and that of Mason is that the present study had about a third of its sample composed of females. This is in contrast to Mason's sample that was composed of males only. Studies have shown that the prevalence of cannabis use is much lower amongst females and the present study has further confirmed that.

Mason also had age restriction in her inclusion criteria for her study of 18 to 30 years. Studies have shown that the younger age group like the one in her study has a higher prevalence of cannabis use.

The significantly lower prevalence of subjects in the control group testing positive on urinary cannabinoids testing is of interest as it suggests that there were not significantly many subjects in the control group that used cannabis for medicinal purposes or any other reason. The control group had severe medical conditions including conditions that have been cited by the literature as indications or reasons for use of cannabis for medicinal purposes. One would have expected to find a significant number of patients who use cannabis for medicinal purposes in the control group.

The prevalence of subjects testing positive for urinary cannabinoids in the control group is even lower than that found by Rolfe et al (1993) among non psychotic psychiatric patients.

5.5   PAST PSYCHIATRIC HISTORY

62.5% of subjects in the study group had a past history of a psychiatric illness. This was an exclusion criterion for control subjects. The presence of a psychiatric illness among the control group would have made it difficult to compare the two groups. The absence of a psychiatric diagnosis in the control group may be an important factor that could explain the low incidence of positive urinary cannabinoids in this group if one concludes that there is a relationship between a psychiatry diagnosis and the presence of cannabis use.

With 62.5% of subjects in the study group having had a prior history of a psychiatric illness, it is likely that most patients admitted in A Ward, King Edward VIII hospital are not presenting with the first episode of a psychiatric illness. Many factors are involved in the relapse of psychiatric disorders and the resultant hospital admissions and substance use is one of them. Cannabis abuse is associated with up to four times the risk of psychotic relapse (Linszen et al 1997). Cannabis abuse has emerged as the strongest predictor of a psychotic relapse over a 12 months period when compared with a range of other risk factors, including medication adherence, duration of untreated psychosis, chronic and acute stress and expressed emotions (Linszen et al 1994, Linszen et al 1997).

Hides et al (2006) also conducted a prospective study that explored the influence of cannabis use on psychotic relapse in a sample of young people with recent onset psychosis. The frequency of cannabis use emerged as a strong predictor of time to psychotic relapse over a 6 months period. This was independent of other key predictors of poor outcome, including medication adherence, stress and duration of untreated psychosis.

5.6   SELF – REPORTING OF CANNABIS USE AND THE USE OF OTHER SUBSTANCES

Self reporting of cannabis use by the subjects in the study group and subjects in the control group was significantly low as there were only 7 (10.9%) subjects in the study

group reporting such use and no control subjects reporting cannabis use. These results are not in keeping with the results obtained with objective testing using a test for urinary cannabinoids. This low specificity of self – reporting of cannabis use is not in keeping with the findings of Sembhi and Lee (1999). In their sample that was composed of patients who were admitted in an acute psychiatric admissions unit, 31% of patients tested positive for urinary cannabinoids and 86% of patients admitted to have tried cannabis at least once. The patients who tested positive for urinary cannabinoids were more likely to report using cannabis most days, to have used more potent preparations of cannabis at some time and to have used other illicit substances (Sembhi and Lee 1999). The findings of Sembhi and Lee suggest that in their sample patients were more likely to report cannabis use than to test positive on objective testing for urinary cannabinoids. In the current study the subjects are less likely to report cannabis use and more likely to test positive on objective testing. This is clearly shown by poor sensitivity (21%) and high specificity of self reporting of cannabis use when compared with urinary cannabinoid measurement (Table XII p. 57). This means that clinicians working in our psychiatry unit should not rely on patients' reports about cannabis use when excluding a psychiatry diagnosis related to cannabis use and objective testing should always be obtained.

This reluctance by patients to reveal cannabis use has been found in other studies. In a prospective controlled study conducted in Springfield Hospital, south London, with the aim of following up patients who present to an acute ward with florid psychotic symptoms, it was established that subjects were unable or unwilling to recall when,

where, or how much cannabis they had used before admission or to provide an estimate of cost or potency (Mathers and Ghodse 1992).

Out of the 7 case subjects who admitted to have used cannabis in the past, only 4 subjects tested positive on objective testing. This study did not quantify the amount of cannabis used, and the duration of such use. It was also not established whether the use was recent or not. These factors could account for the negative test in 3 out of 7 subjects reporting cannabis use. At most urinary cannabinoids remain positive up to 6 weeks upon cessation of cannabis use.

There was a much higher number of subjects in the study group reporting use of other substances. Alcohol was the most frequently reported substance. Firstly, this may be due to the fact that studies in South Africa have repeatedly shown that alcohol is the most frequently used substance. In a study conducted to determine the lifetime prevalence of psychiatric disorders in South Africa, the most prevalent psychiatric disorders were alcohol abuse (11.4%), major depression (9.8%) and agoraphobia (Stein et al 2008).The work of SACENDU as reviewed by Charles et al (2002) revealed that alcohol is the most commonly used substance across all major cities in South Africa. This high prevalence of alcohol use has not only been shown in psychiatry studies, but it has also been shown in trauma patients (Mura et al 2003). Nair and Pillay (1997) conducted a study to elicit the individual and comparative prevalence of psychiatric disorder in medical, surgical and gynaecological wards in King Edward VIII Hospital, Durban. In their findings alcohol dependence was the most prevalent psychiatric disorder with 48% of their sample fulfilling the criteria for

alcohol dependence. Of interest is that only 2% of their study subjects met the criteria for cannabis dependence. It may also be due to the cultural and social acceptability of alcohol use resulting in higher use of alcohol when compared to cannabis in the general population and higher likelihood for one to report alcohol use.

Use of other illicit drugs such cocaine, mandrax and others was extremely low for both the study group and the control group. Use of these drugs was low even amongst those subjects who tested positive for urine cannabis. Again this could be due to the subjects not reporting such use. Objective testing for other illicit drugs was not part of the design of this study. The results of such testing especially among those subjects who tested positive for urinary cannabinoids would be of interest. Studies have shown that cannabis is commonly used with mandrax in what is called 'white pipe' in Cape Town, South Africa. White pipe is not a commonly used substance in Durban and studies that compared substance use among major cities of South Africa have not found higher incidence of white pipe use in Durban as compared to other centres (Parry et al 2002).

While there are differences in substance use between the different cities of South Africa, this is likely to change with time as the trends of substance use are changing and evolving with time.

It has been alleged that use of cannabis eventually leads to the use of illicit drugs and this is called the "gateway hypothesis". The "gateway hypothesis" holds that abusable drugs occupy distinct ranks in a hierarchy as well as definite positions in a temporal

sequence. Accordingly, substance use is theorized to progress through a sequence of stages, beginning with legal, socially acceptable compounds that are low in the hierarchy, followed by use of illegal "soft" and later "hard" drugs ranked higher in the hierarchy (Tarter et al 2006). Tarter et al (2006) examined the "gateway hypothesis" in their study on predictors of marijuana use in adolescents before and after licit drug use. One of the major findings of their study was that there was a high rate of non-conformance with the temporal order of the gateway hypothesis. An adjustment style featured by delinquency, affiliation with deviant peers, and low connectedness to school was associated with transition from licit to illicit drug use. Although the current study was not designed to explore the controversies of the "gateway hypothesis", it is of interest to note that the low incidence of use of other 'hard' drugs in this study does not give support to the "gateway hypothesis". However, it must be emphasised that one cannot make conclusions on the gateway hypothesis using the current study and further studies are required to evaluate the "gateway hypothesis".

5.7 LIMITATIONS OF THIS STUDY

The demographic data as well as the data on the use of cannabis and other substances was not verified with the family members or guardians. It would be of interest to establish whether collateral information would correlate with the reports of subjects as well as with urinary cannabinoid testing.

The quality of the results of this study on the self reporting of cannabis use would have been improved if the specific questions on cannabis use were included in the demographic questionnaire (Appendix D). These could have been structured such that they establish present use of cannabis, recent use, and if cannabis has ever been tried by the subject. The quantity of cannabis used could have been established as well. The quantity of use of other substances was also not established.

The actual ages of the subjects were not used. Instead the patients were categorised into various age groups. As a result of this, the mean age and range could not be calculated.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

The prevalence of cannabis use among psychiatric patients in the current study is higher than that found in the control group of medical patients and it is probably higher than in the general population. This high prevalence was maintained in the current study even though the severely psychotic and agitated patients were excluded. This high prevalence of cannabis use among psychiatric patients has been confirmed in other studies. The findings of this study confirm the second hypothesis of the current study that there is increased use of cannabis among psychiatric patients when compared with medical patients. It is concluded that the prevalence of cannabis use among psychiatric patients in this study is higher than that of the general population of South Africa even though the current study did not directly compare cannabis use among psychiatric patients with that of the general population. It is evident in this study that there is an association between cannabis use and a psychiatric diagnosis and such an association is likely to negatively affect the prognosis of the cannabis use as well as that of the psychiatric diagnosis.

Within the group of subjects who tested positive for urinary cannabinoids there was a substantial representation of patients with psychotic disorders, especially schizophrenia. This further confirms the probable association between cannabis use and psychotic disorders. The age group most affected by cannabis use in the current study was that of young adults. The three mechanisms that could explain the relationship between cannabis use and earlier age at psychosis onset in males as postulated by Veen et al (2004) and discussed above are of interest. Most interesting is the possibility that cannabis may result in the manifestation of schizophrenia in young subjects who are genetically at risk of developing schizophrenia but who would have otherwise not developed the disorder had they not used cannabis. The findings of the current study and the assertions by the scientific community about the relationship between cannabis use and psychosis should further compel the researchers to explore this association. It is important to emphasise that this study does not prove a causal relationship between cannabis use and psychotic disorders. Psychiatrists and other professionals who are involved in mental health care in South Africa should find the results of this study useful when they are formulating psycho education programmes for psychiatric patients and especially those patients with psychotic disorders. The findings of the current study that there is increased use of cannabis among psychiatric patients should send caution to legislators in South Africa who are being lobbied to decriminalise possession of cannabis. Further studies must be conducted in South Africa to establish the reasons for this increased use of cannabis among psychiatric patients and to validate the several hypothesis that have been put forward in literature for such increased use.

This study does not prove that cannabis increases the risk of mental illnesses and it has proven to be difficult to prove this conclusively in many other studies. However, a close association between positive urinary cannabinoids and a psychiatric diagnosis especially psychosis has been shown in this study. Such an association could not be shown with medical diagnoses. The co occurrence of substance use and psychiatric illness is of interest as there is a very limited number of facilities in South Africa that offer specialised care to patients with such a presentation. The results of this study are challenging researchers to do further research on this topic and explore the possibility of having a specialised facility in the province of KwaZulu-Natal that will focus on research and treatment of patients with co morbidity of substance abuse and a psychiatric illness. This specialised facility should focus on young adults, especially males, as the current study reveals that this population group among psychiatry patients is the most affected. Such units often termed "Dual Diagnosis Unit" are already being established in psychiatric units in other parts of South Africa such as in Sterkfontein Hospital in Johannesburg. However these "Dual Diagnosis Units" are still at their infancy.

The prevalence of use of cannabis by the medically ill patients is low in this study. This further suggests that patients admitted at King Edward VIII for medical reasons that require tertiary care, do not necessarily use cannabis to ameliorate the symptoms of their severe illnesses as it has been put forward in the literature. However, further studies are required to further elucidate this use of cannabis for medicinal reasons. In the current study it was not part of the protocol to exclusively select medical patients

that have illnesses such as cancer and AIDS that have been reported in literature to have increased use of cannabis for medicinal purposes.

In the present study all subjects who tested positive for urinary cannabinoids were unemployed. Unemployment in South Africa is generally high. People who have a vulnerability for unemployment such as people with psychiatry disorders are likely to be stigmatised and not be given opportunities of employment. People with psychotic disorders as well as substance abuse may be occupationally dysfunctional as a clinical feature of these illnesses. It is not surprising that in the current study, the subjects who tested positive for urinary cannabinoids, who also happen to have a psychiatry disorder and mostly a psychotic disorder, were unemployed. There is a combination of multiple factors that result in these subjects being unemployed but the effects of the psychotic disorders and the effects of substances such as cannabis on human brain should rank very high.

Self reporting of cannabis use in this study was very poor and it did not correlate with objective testing of urinary cannabinoids and it also did not compare with other studies in the literature that were done elsewhere. Most psychiatrists are sceptical about the reliability of the patients admitting to use of cannabis. This is an important concern as objective testing for urinary cannabinoids is an expensive and time consuming exercise in a setting where there are limited resources. If the patients' history of their use of cannabis could be relied on, it would not be necessary to always get an objective test to confirm patients' use of cannabis. However, self reporting of cannabis use in this study was unreliable.

It is the author's suggestion that another study be conducted in the Durban Functional Area to further explore the reliability of self reporting of cannabis use by patients. If such a study confirms the findings of the current study, then we should ascertain the reasons for such a refusal by our patients to disclose their cannabis and consider ways of dealing with this non disclosure. It would also be necessary that the design of that study be very informed by the designs of the studies that found high prevalence of self reporting of cannabis use.

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APPENDIX A

INFORMED CONSENT

TITLE OF THE STUDY: CANNABIS USE IN PSYCHIATRIC INPATIENTS

1. I (Name),…………………………………………………………………

    hereby consent to the following procedure being conducted on myself or the

    person indicated in 4 below: Collection of urine for testing for cannabis.

    2. I acknowledge that I have been informed by Dr Talatala concerning the

    possible adverse effects which may result from the abovementioned procedure

    and/or treatment and of the ways in which it is different from the conventional

    procedure and/or treatment.

    3. I (Name),………………………………………………………………….

    Hereby acknowledge that I understand and accpt that this study involves research

    and "Information to Patients" leaflet has been handed to me in connection with this

    study.

    4. I agree that the above procedure and/or treatment will be carried out and/or

    supervised by Dr Talatala.

5. I acknowledge that I understand the contents of this form, including the

information provided in the "Information to Patients" leaflet and as the

SUBJECT   PARENT   GUARDIAN   OTHER

freely consent to the above procedure and/or treatment being conducted on:

NAME:……………………………………………………………………..

6. I am aware that I may withdraw my consent at any time without prejudice to

further care.

_____   Date:_____

For illiterate subjects mark

with a **'X'**

Independent witness:

_____   Date:_____

Details of independent witness

1. Title plus name:

2. Telephone number:

APPENDIX B

INFORMATION GIVEN TO PARTICIPANTS

I am Dr Talatala working in the Department of Psychiatry, Nelson R. Mandela School of Medicine. I am conducting a study to find out about the use of cannabis/dagga in patients admitted to this ward. Urine will be taken from you with your permission and will be tested for cannabis. The collection of urine is by naturally passing urine into a specimen container. The test results and any personal information given to me will be confidential and will be known only to myself.

If your test result is positive, I will inform you of this if you desire and I will offer you counselling and treatment. Your participation in this study is voluntary. Your participation in the study and the results of the test will not harm, or compromise the treatment of your medical or psychiatric condition an any way. Your care at King Edward VIII Hospital will remain the same irrespective of your participation or non participation.

In an event that your test result becomes positive, I will not judge or stigmatise you as a cannabis abuser. The doctor who will be treating you will have nothing to do with your results.

Apart from voiding of urine once, you will not be required to do any test or participate in anything for the purposes of this study.

The reason for doing this study is to find out if our patients have a problem of smoking dagga. The information obtained from the study will be used to make plans for helping patients who have a problem with dagga and devise means of preventing the problem.

Title of the study: CANNABIS USE IN PSYCHIATRIC INPATIENTS

Sign:_____   Date:_____

APPENDIX C

ULWAZI OLUNIKEZWA ABAZONGENA OCWANINGWENI

(Translation of appendix B into isiZulu)

Igama lami ngingudokotela uTalatala. Ngisebenza kumnyango wabagula

ngengqondo eNelson R. Mandela School of Medicine. Ngenza ucwaningo

lokuthola ukusetshenziswa kwensangu yiziguli ezilaliswe ewodini yabagula

ngengqondo, esibhedlela saseKing Edward VIII.

Kuzothathwa umchamo, ngemvume yakho, ukuze uhlolelwe ubukhona bensangu.

Umchamo uzothathwa ngendlela ejwayelekile ngokuchamela esitsheni.

Imiphumela yalokuhlolwa kanye nemininingwane yempilo yakho kuzohlala

kuyimfihlo engezudluliselwa komunye umuntu ngaphandle kwami. Uma

umphumela ukhombisa ubukhona bensangu, ngizokwazisa uma ufisa ukwazi,

ngikunike izeluleko nokwelashwa.

Ukungena kwakho kulo.lucwaningo kungokwentando yakho. Ukubakhona kwakho

kanye nemiphumela yokuhlolwa ayizukwenza okubi noma yenze ukwelashwa

kwakho emzimbeni nasengqondweni kungabi okuseqophelweni eliphezulu.

Ukunakekelwa kwakho esibhedlela saseKing Edward VIII akuzushintsha ngisho

ukhetha noma ukungangeni kuloucwaningo.

Uma imiphumela yakho ikhombisa ukubakhona kwensangu angizukwehlulela noma ngikucwase ngithi uyisidakwa sensangu. Udokotela ozobe ekwelapha akazukwenza lutho ngemiphumela yalolucwaningo.

Ngaphandle kokunikeza umchamo kanye akuzudingeka ukuthi wenze okunye ukuhlolwa noma kubekhona okunye okuzodingeka ukwenze okumayelana nalolucwaningo.

Isizathu sokwenza lolucwaningo wukufumanisa ukuthi ngabe iziguli zethu zinenkinga yokubhema insangu na. Ulwazi oluzokufumaniseka kulolucwaningo luzokusetshenziswa ukwenza izinhlelo zokusiza lezoziguli ezinenkinga yensangu futhi senZe nezindlela zokuyigwema lenkinga.

Isihloko socwaningo: UKUSETSHENZISWA KWENSANGU NGABANTU ABAGULA NGENGQONDO.

Sayina lapha:_____   Usuku:_____

APPENDIX D

DEMOGRAPHIC DATA

NAME:_____   **AGE**_____

HOSPITAL NUMBER:_____ **PSYCHIATRY No.:**_____

A.   AGE:

<div style="border:1px solid black; width:80px; height:80px;"></div>

    1.   18 – 20 YEARS

    2.   21 – 30 YEARS

    3.   31 – 40 YEARS

    4.   41 – 50 YEARS

5. 51 – 60 YEARS

B.   SEX:

1. MALE

2. FEMALE

C.   EMPLOYMENT:

1. EMPLOYED

2. UNEMPLOYED

3. SCHOLAR

4. TERTIARY STUDENT

D.   EMPLOYMENT CATEGORY:

1. FORMAL EMPLOYMENT

2. INFORMAL EMPLOYMENT

3. UNEMPLOYED

E.   URINE CANNABIS RESULT:

1. POSITIVE (P)

2. NEGATIVE (N)

F.   PSYCHIATRY DIAGNOSIS (DSM IV TR CODE):

G.   MEDICAL DIAGNOSIS:

H. **PAST PSYCHIATRIC HISTORY:**

1. YES

2. NO

I. **SUBSTANCES ABUSED (MORE THAN SOCIAL):**

1. ALCOHOL

2. LSD

3. GLUE

4. HEROIN

5. COCAINE

6. ECSTASY

7. OTHER (INCLUDING CANNABIS)

8. NIL

J. **PRESENCE OF SUBSTANCE ABUSE BEFORE THE ONSET OF MENTAL**

ILLNESS AS REVEALED BY GAURDIAN:

1. YES

2. NO