

**INCIDENCE AND SEVERITY OF PRURITUS IN PATIENTS
DELIVERED BY CAESAREAN SECTION UNDER SPINAL
ANAESTHESIA
AT CHRIS HANI BARAGWANATH HOSPITAL**

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A dissertation submitted to the Faculty of Health Sciences, University of the Witwatersrand,
Johannesburg, in fulfilment of the requirements for the degree of Master of Medicine

(In the branch of Anaesthesiology).

February 2013

DECLARATION

I declare that the work contained in this dissertation is my own, unless otherwise acknowledged. It is being submitted for the degree of Master of Medicine (in the branch of Anaesthesiology) at the University of the Witwatersrand, Johannesburg.

It has not been submitted before for any other degree or examination in any other university.



Dr. K. Mwinyoglee

Signed at Johannesburg

This 27th of February 2013

DEDICATION

This research report is dedicated to:

my husband **John Mwinyoglee**

and my children, **Emmanuelle and Joshua,**

for their support and sacrifices throughout my studies at

the University of the Witwatersrand.

ACKNOWLEDGEMENTS

I would like to thank my two supervisors, namely, Professor E Buchmann and Professor AC Lundgren, who put up with a lot of anguish from me and yet carefully guided me to undertake and complete this study scientifically. They shared the times when I was enjoying the work as well as the times when events in my life threatened to stop my enthusiasm.

Many people helped me with suggestions, comments and various technical issues. I appreciate everyone who assisted me in various ways especially: Dr. J. Mwinyoglee, Dr. A. Beke, Dr. J. Gwaro, Dr. G. Nethate, Prof. E. Libhaber, Mrs. J. Kayumbi, and Mr. A. Dalvit.

Also, a big thank you to all the people including my family who had to cope with a lot of my stress.

Last but not least, my gratitude goes to the patients, the nurses and my fellow colleagues who took an interest in this research project and patiently worked with me until the project was completed.

ABSTRACT

BACKGROUND AND OBJECTIVES

Local anaesthetic agent mixed with an opioid provides effective, fast and reliable onset of regional analgesia. However, the intrathecal use of opioids may have undesirable effects, one of which is pruritus (itching). The main objectives of this study were to assess the incidence and severity of fentanyl-induced pruritus in patients who received spinal anaesthesia for caesarean section at Chris Hani Baragwanath Academic Hospital, and to determine the influence of factors such as dosage of fentanyl, age, race, and socio-economic status on the perception of pruritus.

METHODS

This was a prospective observational study of obstetric patients delivered by elective caesarean section under spinal anaesthesia at Chris Hani Baragwanath Academic Hospital. Regional anaesthesia was performed following a departmental protocol where patients received 0.5% bupivacaine with dextrose mixed fentanyl. The departmental protocol was used as a guideline for the mixture but the different anaesthetists were not restricted to it. Based on their practice, a range of fentanyl doses were used. The participants were observed for pruritus directly intraoperatively by the researcher, and again at approximately one hour after spinal anaesthetic administration. This last observation was complemented by means of a structured interview. Severity was assessed using a visual analogue scale. For descriptive analysis, to show a 95% confidence interval of no more than 10% around an observed percentage of patients with pruritus, a sample size of 96 participants was chosen.

RESULTS

The overall incidence of pruritus in 96 participants who received intrathecal fentanyl was 54.2%. Pruritus occurred in 48 participants (50.0%) during the caesarean section. Four participants (4.2%), who had no pruritus intraoperatively, developed it one hour after the spinal anaesthetic was administered. The part of the body commonly affected was the nose. The severity of pruritus was more than tolerable in 6 participants (6.3%), with two of them perceiving it as unbearable. No participant reported pruritus 24 hours after the spinal anaesthetic. There was no statistically significant association between the frequency of pruritus and the dose of fentanyl, age, race and socio-economic status indicators.

CONCLUSION

Pruritus is a common symptom in women undergoing caesarean section using fentanyl-containing neuraxial block. However, most cases are mild and not related to dosage. Women who complain of intraoperative or postoperative pruritus can be informed that the symptom is transient and of no serious clinical consequence.

KEYWORDS:

Pruritus, fentanyl, spinal anaesthesia, caesarean section.

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CHAPTER 1 INTRODUCTION

1.1 Introduction

Reproduction is essential for the continuous existence of all species including humans. Human reproduction is associated with pain and this has been known since biblical times when Eve was told she would reproduce in pain¹.

The acceptance, perception and tolerance of pain associated with delivery differ amongst individuals. Cultural and social factors as well as the psychic influence and previous pain experience determine the ability to cope with pain².

Anaesthetic practice from its foundation has been aimed at minimizing peri-operative pain and its consequences following surgical operations³. Caesarean delivery was introduced in 1794⁴ to enable safe delivery for those who could not deliver vaginally and since then it has become a common method of childbirth worldwide⁵.

Caesarean section performed under regional anaesthesia enables the obstetric patient to take part psychologically in the delivery process, and bonding with the newborn is immediate compared with general anaesthesia. Regional block is also associated with a reduction in the stress response following surgery⁶. Furthermore, general anaesthesia for caesarean section is associated with risks such as failed intubation, aspiration of gastric contents into the lungs, and potential hypoxic brain injury, and even death, compared with regional anaesthesia⁷.

The caesarean section rate is one of the key maternal health indicators used in the evaluation of safe motherhood programmes⁸. The World Health Organization (WHO) recommends a caesarean section rate of 10-15% among low risk pregnant patients⁹. Caesarean section rates vary from 10% in Sweden to 80% in Brazil^{10, 11}. In South Africa, the caesarean section rate varies from 30% to 59% in some urban metropolitan settings and from 16% to 32% in some district hospitals¹². In one study in the private sector in South Africa, the caesarean section rate was 60.4%¹³. In trying to align with the WHO in ‘accounting for every mother and every child’¹⁴, it is expected that the caesarean section rate will continue to rise.

Maternal mortality from anaesthesia remains a serious challenge worldwide because of the number of caesarean sections performed. The case fatality rate in the United States for general anaesthesia is 6.5 per million and the rate for regional anaesthesia is 3.8 per million¹⁵.

In South Africa, the maternal mortality ratio (maternal deaths per 100 000 live births) was estimated to be 237 in 2008¹⁶. Of the 3296 maternal deaths in the ‘Saving Mothers’ report¹⁷ of the second triennium of confidential enquiries into maternal deaths, there were 91 deaths resulting from anaesthesia. In that report, 53% of the 91 maternal deaths had general anaesthesia, and 47% had spinal anaesthesia. Anaesthesia was the third commonest cause of deaths in level 1 hospitals. The report recommended that skills in anaesthesia should be improved at all levels of care and that regional anaesthesia should be promoted at all sites performing caesarean sections. The report further stated that a target of 75% of all caesarean sections should be under regional anaesthesia in the future. Along with the expected increase in spinal anaesthesia, it is likely that more side-effects and adverse effects of regional anaesthesia will be experienced in South African settings.

Neuraxial block, particularly spinal anaesthesia using local anaesthetic agents with or without opioids, is the recommended anaesthesia of choice for women undergoing caesarean sections in South Africa unless other medical conditions render it unsafe¹⁸.

1.2 Discovery of opioid receptors in the spinal cord

Opioids are potent analgesics. The discovery of opioid receptors in the spinal cord¹⁹ led to the use of neuraxial opioids for analgesia for women in labour and for caesarean deliveries. The aim of using opioids with local anaesthetic agents is to reduce the quantity of local anaesthetic agent used and to minimize the occurrence of side-effects of the local anaesthetic, to prolong analgesia and decrease motor block. Thus, the total dose of bupivacaine used for regional analgesia and anaesthesia is reduced when it is used in conjunction with opioids. The occurrence of hypotension, an undesirable effect of local anaesthetics, is reduced because this side-effect is dose dependent, with higher doses of bupivacaine causing more severe hypotension.

1.3 Opioids used for intrathecal analgesia

Table 1 shows different opioid preparations used in combination with local anaesthetic agents for spinal analgesia and anaesthesia, with their onset and duration of action as well as the side-effects of each agent.

Opioids added to local anaesthetics improves the quality of intra operative somatic and visceral analgesia as well as longer post-operative pain relief compared to local anaesthetic alone²⁰. The reduction in pain perception depends on how rapid the opioid is distributed from the site of administration to the rest of the cerebrospinal fluid and spinal cord, the clearance from the spinal

cord to the plasma, and the rostral cerebrospinal fluid migration. These properties differ with different opioids.

After intrathecal administration, morphine stays within the spinal cord for a longer duration, migrates rostrally and is slowly cleared from the spinal cord to the plasma. Its postoperative analgesia is of a long duration and so are its side effects. The more lipophilic agents are rapidly cleared from the spinal cord.

Fentanyl migrates rapidly into the epidural space, sequesters into the epidural fat and then diffuses into the plasma. Sufentanil is more lipophilic than fentanyl. It has limited free drug available in the spinal cord as the drug is quickly removed from the spinal cord into the blood. Thus fentanyl and sufentanil have rapid onset of action and hence improve intraoperative analgesia whilst morphine mainly improves postoperative analgesia.

The side-effects of these opioids are supraspinal, affecting areas above the level of their administration^{21,22}. They depend on the rostral spread or distribution of the opioid into the cerebrospinal fluid and spinal cord. Morphine causes respiratory depression more than the other drugs, and therefore the dose of morphine should not exceed more than 0.3 mg in the subarachnoid space.

TABLE 1 : Opioids for intrathecal analgesia and anaesthesia

Drug (Preservative free)	Intrathecal single dose	Onset (minutes)	Duration (hours)	Side-effects
Fentanyl	5-25 mcg	5-10	1-4	Urinary retention, pruritus, nausea and vomiting, respiratory depression
Sufentanil	2-10 mcg	5-10	2-6	Urinary retention, pruritus, nausea and vomiting, respiratory depression
Morphine	0.1-0.5	45-75 min	18-24	Urinary retention, pruritus, nausea and vomiting, respiratory depression

1.4 Possible side-effects of neuraxially administered opioids

The side-effects of neuraxially administered opioids are the results of stimulation of centres at sites remote from where the drug is injected²¹. The capacity for cephalic migration of the opioids depends on their water solubility. Effects such as nausea and vomiting are caused by direct stimulation of receptors in the chemoreceptor trigger zone in the floor of the fourth ventricle. A more serious complication is the stimulation of receptors that control ventilation in the brainstem, leading to respiratory depression²¹. Pruritus following intrathecal administration of opioids is related to an opioid effect on the trigeminal nucleus²³.

1.5 Pruritus following neuraxial opioid administration

Pruritus or itching of the skin is a known side-effect of many drugs including opioids such as fentanyl, and can be an uncomfortable and annoying experience, even exceeding that of post-

operative pain in such a way that it may lead to patient dissatisfaction²³. Patients expect to have pain post operatively but not pruritus, hence when pain is abolished and severe pruritus sets in, pain may even be preferred to the pruritus²⁴.

Neuraxial opioids are commonly used in obstetric and orthopaedic practice for analgesia and anaesthesia, and have been found to cause pruritus in 60% to 100% of patients when used in labouring women^{21,25}, and in 30% to 60% of orthopaedic patients, and 1% to 39% of surgical and gynaecological patients^{22,26}. The high susceptibility of obstetric patients to pruritus following regional administration of opioids may be due to an interaction between oestrogen and opioid receptors^{27,28}. The presence of an 'itch centre' in the central nervous system, which can either be activated or inhibited by neurotransmitters, is suggested to be the pathophysiological mechanism by which itching occurs²⁹. A pathway modulated through serotonin³⁰ and prostaglandins³¹ is said to play an important role in the aetiology of neuraxial opioid-induced pruritus. As with all biological phenomena, differences between individuals influence the perception of itch, likely resulting in the wide range of reported frequencies of neuraxial opioid-induced pruritus³². There appears to be a lack of association between the dose of opioid administered neuraxially and the intensity of pruritus perceived by patients. There are also patients who receive neuraxial opioids and yet do not experience pruritus at all.

Counselling about pruritus may influence some patients to notice itching and therefore increase its frequency and it may equally make the symptom mild or tolerable in others. Hence there is a dilemma about whether to pre-counsel or not, as factors such as anxiety, boredom, distraction and other skin sensation may increase or decrease this very subjective sensation³⁰.

1.6 Classification of pruritus

Pruritus can be classified, based on its anatomical distribution, as either localized or generalized, depending on whether a part of the body or the whole body is affected.

An aetiologically based classification distinguishes pruritus that is associated with skin disease, from pruritus where there is no evidence of skin disease. Opioid-induced skin itchiness is not associated with skin pathology, and yet may be localized or generalized³³.

1.7 Pathophysiology of neuraxially administered opioid-induced itch

Itching is a sensation that affects the superficial part of the skin as well as mucous membranes, particularly the conjunctiva and upper respiratory tract³⁴. It results from stimulation of nerve endings that are located at the junction of the dermis and epidermis. The sensory impulses of itching are transmitted by C-nerve fibres to the spinothalamic tracts and then to the thalamus and cortex. These nerves have thin axons with a slow speed of conduction. The nerve endings for pain are slightly more deeply seated than those that cause itching, and because of their close proximity, there appears to be an antagonistic relationship between itching and pain, with pain abolishing itching³⁵.

Stimulation of peripheral itch nerve endings alone cannot explain neuraxial opioid-induced pruritus. The time of drug administration to onset of pruritus and the distribution of this pruritus points to a direct interaction of the opioid with receptors present in the lower medulla and the trigeminal nucleus³⁶. Opioid-induced itchiness following intrathecal opioid administration usually starts in the nose and upper part of the face, suggesting that the area first stimulated is in the most inferior part of the trigeminal nucleus. This area serves opioid receptors in the ophthalmic division of the

trigeminal nerve²¹. The involvement of the facial areas innervated by the trigeminal nerve suggests that there is a cephalad spread of these opioids in the cerebrospinal fluid to interact with the trigeminal nucleus and nerve roots²³. Since the spinal nucleus of the trigeminal nerve is continuous with the substantia gelatinosa and Lissauer tract at the level of the third and fourth cervical spine, the presence of opioid receptors in this area could explain why the neck and upper thorax are involved in opioid-induced pruritus in some patients²³.

There is induced behavioural excitation that is not reversible with naloxone following the administration of opioid into the cerebral ventricles. It is postulated that central nervous system excitation may be due to mechanisms not involving opioid receptors, and that this excitation may play a role in the pathophysiology of the intrathecal opioid-induced itchiness³⁷

In one animal study³⁷ using monkeys where morphine was injected into the cerebral ventricles, the itching behaviour that was produced could not be reversed with naloxone, suggesting central nervous system stimulation other than from opioid receptors. In the central nervous system, gamma-aminobutyric acid and glycine are inhibitory neurotransmitters and their inhibition by opioids may be responsible for opioid-induced pruritus³⁸. This observation is supported by similar itch and scratch behaviour seen in cats that received intrathecal glycine antagonists such as strychnine, and those that received large doses of intrathecal morphine³⁷.

Serotonin (5-HT₃) receptors are found in large numbers in the region of the nucleus of the spinal tract of the trigeminal nerve³⁹, and injection of morphine into this area in one study⁴⁰ in monkeys resulted in a dose-dependent pruritus on the face that was abolished by naloxone. This suggests that

a 5-HT₃ receptor may be implicated in the development of itchiness associated with the neuraxial administration of opioids.

Other studies^{41,42}, in which non-steroidal anti-inflammatory drugs were used, found a reduction in the incidence of neuraxial-administered opioid-induced pruritus, thus suggesting that prostaglandin (PGE₁ and PGE₂) release may be involved in the development of pruritus³¹.

1.8 Prevention and treatment of intrathecally administered opioid-induced itchiness

The treatment of opioid-induced pruritus is based on the postulated mechanisms by which it causes pruritus and these postulates are controversial. The drugs that are discussed below have been used for the prevention and treatment of opioid-induced itch, but with conflicting results and at significant cost. Drugs such as 5-HT₃ antagonists are costly and yet a systematic review and meta-analysis⁴³ did not find them to significantly reduce the incidence of opioid induced pruritus

1.8.1 Opioid antagonists

Theoretically, an opioid antagonist should be the drug of choice in preventing intrathecal opioid-induced pruritus. The use of opioid antagonists such as naloxone, naltrexone and nalbuphine in the prevention of neuraxial opioid-induced pruritus could reduce pruritus, but the analgesic requirement of these patients may be increased.

1.8.2 Propofol

Propofol is a hypnotic agent that depresses the posterior horn transmission of itch sensation in the spinal cord. Propofol is considered less effective than opioid antagonists mentioned in the previous

paragraph⁴⁴. However, sub-hypnotic doses of propofol have been found to prevent pruritus in about 80% of patients receiving neuraxial administered opioids⁴⁵.

1.8.3 Non-steroidal anti-inflammatory drugs

Non-steroidal anti-inflammatory drugs (NSAIDs) inhibit the production of prostaglandins. Prostaglandin E₁ (PGE₁) and Prostaglandin E₂ (PGE₂) are involved in the pathophysiology of opioid-induced pruritus. This effect was offered as an explanation for the significant decrease in the incidence of intrathecal opioid-induced pruritus when diclofenac and tenoxicam were compared with a placebo^{41, 42}.

1.8.4 Droperidol

This neuroleptic drug has been found to be effective in suppressing pruritus following the use of intrathecal opioids^{23,45,46}. Droperidol exerts its antipruritic effect by depressing the conduction of itch sensation in the posterior horn of the spinal cord^{23,45}, and by exerting weak 5-HT₃ receptor antagonism⁴⁶.

1.8.5 5-HT₃ receptor Antagonists

As mentioned previously, there is evidence of a high density of 5-HT₃ receptors in the nucleus of the spinal tract of the trigeminal nerve in the medulla oblongata³⁹. Opioids, particularly morphine injected into this area may produce a pruritus that is reversed by naloxone, implicating 5-HT₃ as a cause of pruritus⁴⁰. Based on this finding, a 5-HT₃ receptor antagonist should prevent intrathecal opioid-induced pruritus. Ondansetron, a 5-HT₃ receptor antagonist, has been found to significantly decrease the incidence of pruritus caused by intrathecal administration of opioids⁴⁷⁻⁴⁹. However, a

review⁵⁰ and a more recent randomised controlled trial⁵¹ did not find ondansetron or granisetron better than saline in reducing the incidence of intrathecal opioid induced pruritus.

1.8.6 Antihistamines

Antihistamines are useful in the management of itchiness in conditions where histamine is released. Pruritus secondary to histamine release is associated with urticaria. Histamine has however not been shown to be involved in the pathophysiological mechanism of neuraxial opioid-induced pruritus²⁴, and therefore antihistamines have no role in the management of this specific symptom.

1.8.7 Multimodal approaches

The multiple neurotransmitters that seem to play a role in the pathophysiology of intrathecal opioid-induced pruritus point to the need for a multimodal approach to the treatment or prophylaxis of this symptom⁵⁰. A combination of naloxone, 5HT-3 receptor antagonist and propofol may therefore be considered. It appears that these drugs are not locally registered for the purpose of treating intrathecal opioid-induced pruritus. The required dosage of each drug needs to be studied. The cost-benefit ratio of prophylaxis versus treatment of this symptom also needs to be taken into consideration.

1.8.8 Current recommendations on dosage of intrathecal opioid

It is currently advised to use the minimum dose of opioid necessary to produce analgesia so as to minimize the occurrence of side-effects (including pruritus), although it appears that the occurrence of pruritus may not be dose related. The South African guidelines on management of acute pain in obstetric patients recommend a volume of 2.0 to 2.5 mL 0.5% heavy bupivacaine (bupivacaine with dextrose) and 1.8 to 2.0 mL 0.5% heavy bupivacaine with 12.5 to 20 mcg of fentanyl added.

However, more studies are required to elucidate the pathophysiology of pruritus and to improve preventive and treatment strategies.

1.9 Problem statement and objectives

Itch is inhibited by pain, and abolition of pain transmission enhances itchiness. This dilemma is the driving force of scientific research to find means of achieving antinociception (pain relief) with tolerable side effects that will improve patient satisfaction, yet is cost effective.

This prompted the wish to investigate intrathecal opioid-induced pruritus at caesarean section in Chris Hani Baragwanath Academic Hospital, and then to plan a follow-up study to determine the prevention and treatment modality of choice for opioid-induced pruritus at this institution. Between 500 and 700 obstetric patients are delivered by caesarean section at the hospital every month, and the anaesthetic method of choice is spinal block. The need for fast-onset, reliable anaesthesia for this procedure is very important in this context, given the high turnover of caesarean section cases. In this context, attention to the patient's satisfaction may be easily overlooked. Pruritus has been observed in some of the patients undergoing caesarean section under neuraxial blockade using bupivacaine and fentanyl at Chris Hani Baragwanath Academic Hospital. Hence the need to study the incidence and severity of pruritus in this population.

The specific objectives of this study were:

1. To assess the incidence of intrathecal fentanyl-associated pruritus in patients who received spinal anaesthesia for elective caesarean section.
2. To establish the duration and severity of intrathecal fentanyl-associated pruritus in the above group of patients.
3. To establish whether factors such as age, race, socio-economic status, smoking, alcohol consumption, medical history, and dose of fentanyl possibly affect the incidence and severity of this symptom.

CHAPTER 2 METHODS

2.1 Study design

This was a prospective cross sectional study among obstetric patients delivered by elective caesarean section under spinal anaesthesia. In this descriptive study, pruritus, a dichotomous variable is either present (yes) or absent (no). Findings were expressed as a confidence interval (CI) around the estimated mean.

2.2 Ethics Committee approval and permission

The protocol for this study received approval from the Human Research Ethics Committee of the University of Witwatersrand (Appendix C). The protocol was accepted for study for the degree of Master of Medicine in the field of Anaesthesiology at the University of the Witwatersrand. Data was collected and recorded on the data collection sheet (Appendix B) after obtaining a written informed consent from the study participant (Appendix A). Permission to conduct the study was obtained from the Chief Executive Officer of Chris Hani Baragwanath Academic Hospital (Appendix D).

2.3 Setting

An average of six elective caesarean section deliveries is performed each day at Chris Hani Baragwanath Academic Hospital. Unless there are contra-indications to regional anaesthesia, spinal anaesthesia (neuraxial blockade) is the procedure used and this is done with the patient in the sitting position. The procedure is performed under aseptic technique by the anaesthetist on duty in the

maternity operating theatre and the protocol on spinal anaesthesia used by the Department of Anaesthesiology (Appendix E) is used as a guideline for the spinal mixture.

The expected operating time for the caesarean section procedure is 30 minutes. Standard premedication according to the departmental protocol includes metoclopramide 10 mg intramuscularly 30 minutes pre-operatively, and sodium citrate 30 mL orally. Intravenous access is gained peripherally by means of a large-bore cannula (18G).

At the time of the study, the anaesthetists on duty were not involved in the research project, other than routinely giving the spinal anaesthetics, and did not discuss the possibility of pruritus with the patients before the operations.

2.4 Study population

Patients eligible for participation in the study were 18 years old and above, ASA (American Society of Anaesthesiology) class I and II, with no known history of allergy or atopy, even though some of them were on treatment for HIV and /or treatment for hypertensive disorders of pregnancy or respiratory/urinary tract infection presenting for delivery by elective caesarean section under spinal anaesthesia. None of the participants on entry into the study had pruritus. The anticipated time of surgery was expected to be less than an hour.

Patients were excluded if they were in labour and were coming to be operated as an emergency. They were also excluded if the obstetricians anticipated intraoperative complications or factors that would prolong the duration of the caesarean section or if they were unwilling to participate in the study.

2.5 Sample size

To estimate the sample size, we used the expected proportion of women affected by pruritus of 50% as an average from the literature. An estimated incidence of 50% was also appropriate to use for Chris Hani Baragwanath hospital since the incidence of pruritus in this institution is unknown. For a descriptive study to show precision of an estimate with a 95% confidence interval of not more than 10% above and below an observed percentage (approximately 50%) of subjects describing pruritus, the total number (N_i) of participants needed was as follows:

$$N_i = 4(1.96 \times 1.96) \times 0.50 \times 0.50 / 0.20 \times 0.20 = 96.$$

2.6 Data collection

After recruiting the patients to participate in the study, the researcher (the author) completed the demographic and pre-operative checklist as shown in the data sheet in Appendix B. The study was explained as a research project to investigate the effects and side-effects of spinal anaesthesia. The title of the project was withheld from the patients at this stage, because this would have given away the symptom of interest for those patients who might have known, or inquired about, the meaning of the term 'pruritus'. Prior knowledge of the symptom of interest of the study (pruritus) may have sensitized the patient and resulted in an expectation and exaggerated awareness of pruritus, and over-reporting of the symptom. The participant's information leaflet had the study title covered by pasting a sticker over it. From placement of the spinal anaesthetic and for the duration of the operation till the end of an hour post spinal insertion, the researcher observed the patient directly for any scratching, the part of the body scratched and any complaint of itchiness, nausea or

vomiting. The dose of fentanyl used in the anaesthetic mixture, and all drugs given intraoperatively, were recorded. The level of qualification of the anaesthetist on duty (consultant, registrar, medical officer, etc.) was noted.

One hour after the spinal anaesthetic was administered, the researcher asked the patient ‘is everything all right?’ and then went on to ask direct questions about nausea, shortness of breath and itchiness. The sites of itching were asked using a checklist as shown in the data collection sheet in Appendix B and the researcher assessed the severity of itching using a visual analogue scale ranging from 0 (no itching) through to 5 (tolerable) through to 10 (unbearable). On the following morning (postoperative day 1), the researcher returned to interview the patient again about residual itching, in terms of site and severity. This was the last contact with the study participant as it is known that fentanyl related pruritus does not last more than 24 hours based on its pharmacokinetics.

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2.7 Data management and statistical analysis

Descriptive statistical analysis was performed using frequencies and proportions (percentages) for categorical variables, and means with standard deviations, and medians with ranges for continuous variables. To compare the measured outcomes with respect to various explanatory variables and to compare proportions, the Chi-squared test or Fisher’s exact test was used. The Student’s t-test and Mann-Whitney test were used to compare frequency distributions.

Significance was accepted at a P value of less than 0.05. All analyses were performed using Epi Info for Windows version 6.04 (CDC, Atlanta, USA) and Statistical Package for Social Sciences (SPSS) for Windows version 19 (SPSS Inc., Chicago, IL, USA).

CHAPTER 3 RESULTS

3.1 Demographic characteristics

Ninety-six women undergoing elective caesarean section participated in the study. The ages of the participants ranged from 19 years to 45 years with a mean age of 30.3 years, with standard deviation of 6.1. (95% CI 29.1-31.5). Ninety participants (93.7%) were indigenous Africans, 5 (5.2%) were coloured and 1 was white. Fifty-eight participants (60.4%) did not have more than 6 years of basic education and the majority 65 (67.7%) were unemployed. Five participants reported smoking cigarettes (5.2%). Twelve participants (12.5%) said they used alcohol prior to falling pregnant. These findings are presented in Table 2.

TABLE 2 : Demographic data for participants (n=96)

Demographic variables	Number (n=96)	Percentage %
Race:		
White	1	1.0
Coloured	5	5.2
Indian	0	0
African	90	93.7
Education completed:		
Primary (7 Years)	58	60.4
Matric (12 Years)	17	17.7
Post-matric level (12 Years)	21	21.9
Smoking and alcohol:		
Smoker	5	5.2
Alcohol use	12	12.5
Employment:		
Unemployed	65	67.7

3.2 Problems associated with the pregnancies

The most frequent medical problem associated with the pregnancies of the participants was HIV infection. Thirty participants (31.2%), and 29 of them (96.7%) had taken antiretroviral drugs during their pregnancies. Sixteen (16.7%) were on antihypertensive drugs for hypertensive disorders of pregnancy. Antibiotics had been used by 3% of the participants for either respiratory tract infection or urinary tract infection. Table 3 shows medical problems associated with the pregnancies. The names of the antiretroviral medications, antihypertensive agents and antibiotics that were used were not recorded on the data sheets.

TABLE 3 : Medical problems associated with pregnancy (n=96)

Medical Problem	Number	Percentage
Hypertensive disorder	16	16.7
Diabetes mellitus	2	2.0
HIV infection	30	31.3
Other infections	3	3.1

3.3 Dose of fentanyl used and frequency of pruritus

Different doses of fentanyl were administered to the participants intrathecally based on the individual anaesthetists' choices of the volume of spinal mixture according to the protocol in the department (Table 4). A dose of 20 mcg of fentanyl was the one that was frequently used by the anaesthetists. This dose was used in 28 participants (29.2%) and 18 of them (64.3%) developed pruritus. Almost equal numbers of participants received 11.1 mcg, 12.2 mcg, and 22 mcg of fentanyl (n=18,19,17 participants respectively). The proportion that developed pruritus was 44.4 %

for those who were given 11.1 mcg, 36.8% for those who were given 12.2 mcg and 41.2% for the group that received 22 mcg of fentanyl. Five of the 6 participants (83.3%) who were given 12.5 mcg of fentanyl developed pruritus. Table 4 illustrates the number of women with intraoperative pruritus for each dosage, showing no dose response effect with increasing doses (Chi-squared test for trend, $P=0.45$).

TABLE 4 : Dose of fentanyl used in combination with bupivacaine for spinal anaesthesia and the incidence of intraoperative pruritus with each dosage of fentanyl (n=96)

Dosage (mcg)	Number	Percentage	Pruritus	
			Number	Percentage
10.0	6	6.2	3	50
11.1	18	18.7	8	44.4
12.2	19	19.8	7	36.8
12.5	6	6.2	5	83.3
15.0	2	2.1	0	0
20.0	28	29.2	18	64.3
22.0	17	17.7	7	41.2

Chi-squared test for trend (combining 10.0 mcg with 11.1 mcg, and 12.5 mcg with 15.0 mcg), $P=0.45$.

3.4 Pruritus: incidence, sites and severity

The total number of participants who developed pruritus was 52, giving an incidence of 54.2%. Itching with scratching was observed intraoperatively by the researcher in 48 participants, giving an intraoperative incidence of 50.0%. No participant experienced pruritus at the end of 24 hours post

spinal insertion. Of the 48 participants who scratched intraoperatively, itching had stopped in 18 of them and they did not report itching at the end of one hour after the spinal anaesthetic was administered. Four participants who did not have itchiness intraoperatively developed it from the end of the operation to the one hour after spinal insertion.

Pruritus was confined to the upper body, head and neck in all cases, both intraoperatively and postoperatively. The most frequent site was the nose, affecting 25 (26.0%) of the participants intraoperatively and 17 (17.7%) of the participants one hour after spinal anaesthesia was given. Other commonly affected areas included the upper lip, upper face and upper torso (Table 5).

Twenty-three participants (46.9%) scratched at fentanyl doses of less than 15 mcg, and 25 (53.2%) scratched at doses of 15 mcg and above ($P=0.54$). At one hour after spinal insertion, 34 (35.4%) of the participants reported itching. Again, there was no statistically significant association between dose of fentanyl and itching after one hour. Nineteen participants (19.8%) had nausea intraoperatively, while 8 (8.3%) reported nausea one hour after spinal anaesthetic insertion. Lesser numbers of participants reported vomiting and shortness of breath (Table 6).

One hour following spinal anaesthetic insertion, all the participants were asked how they were feeling. Eighty-one of 96 (84.4%) answered that they were feeling 'all right', and 15 said they were not feeling 'all right'. Eight out of the 15 (53.3%) who did not feel 'all right' complained of pruritus while 7 (46.7%) did not. Out of the 81 who felt 'all right', 40 of them (49.4%) had pruritus and 41 (50.6%) did not (Chi-squared test, $P=0.78$).

TABLE 5: Parts of the body affected by pruritus intraoperatively and one hour after administration of the spinal anaesthetic

Part of the body affected	Intraoperative		One hour after spinal	
	N	%	N	%
Upper lip	10	10.4	5	5.5
Lower lip	4	4.2	1	1.1
Nose	25	26.0	17	17.7
Upper face	20	20.8	10	10.4
Lower face	16	16.7	13	13.5
Neck	4	4.2	4	4.2
Upper torso	15	15.6	13	13.5
Entire body	0	0	0	0

TABLE 6 : Side- effects noted in women intraoperatively and one hour after administration of the spinal anaesthetic.

Side-effect	Intraoperative		One hour after spinal	
	N	%	N	%
Itching	48	50.0	34	35.4
Nausea	19	19.8	8	8.3
Vomiting	7	7.3	2	2.1
Shortness of breath	2	2.1	4	4.3

Droperidol was given to 25 participants who were vomiting intraoperatively after the delivery of the baby, but this drug may have an antipruritic and antiemetic effect. Fourteen (56%) of the 25 participants who received droperidol did not demonstrate any evidence of itching whilst 11 (44%) of them complained of itchiness. For those participants who did not receive droperidol, 37 (52%) out of 71 had pruritus. The proportion of participants who developed pruritus in these two groups did not differ significantly (Fisher's exact test, $P=0.64$).

Five women received midazolam intraoperatively for anxiety, and 4 of them (80%) had no evidence of pruritus.

3.5 Severity of pruritus

The severity of pruritus in the 34 participants who reported itching at the end of one hour after the spinal anaesthetic was measured on a visual analogue scale. Six participants found the itch to be more than tolerable (scale >5), with two of these stating that the itchiness was unbearable. Twelve participants found their itch to be tolerable (scale=5) and the remainder regarded their itch as mild and barely felt (Table 7).

3.6 Association of pruritus, age, level of education and employment

Tests for associations between intraoperative pruritus and factors such as age, and level of education were performed and found to have no statistically significant relationships (Table 8).

TABLE 7: Severity of pruritus reported on a visual analogue scale from 1 to 10 one hour after administration of spinal anaesthesia

Visual Analogue Scale (0-10)	Grade of Severity	Number of patients (n=96)	Percentage %
No Itching	0	62	64.6
Barely felt	1	9	9.4
	2	4	4.2
	3	2	2.1
	4	1	1.0
Tolerable	5	12	12.5
	6	1	1.0
	7	1	1.0
	8	2	2.1
	9	0	0.0
Unbearable	10	2	2.1

TABLE 8: Associations between intraoperative pruritus and age, unemployment and educational status, ethnicity

	Intraoperative pruritus (n=48)	No intraoperative pruritus (n=48)	P value
Mean age in years $\pm$ standard deviation	29.9 $\pm$ 6.8	30.8 $\pm$ 5.4	0.51
Primary school education or less	26 (54.2%)	32 (66.7%)	0.21
Non-African ethnic origin	4 (8.3%)	4 (4.2%)	0.68

Univariate analysis testing various variables for association between them and the presence of itching is presented in Table 9. There were no significant associations between incidence of pruritus and cigarette smoking, alcohol intake, hypertension in pregnancy, diabetes mellitus, HIV infection, use of midazolam, and use of droperidol (Fisher's exact test).

Table 9 : Univariate predictors of pruritus intraoperatively

Variables of Interest	Presence of Itching N=48 (%)	Absence of Itching N=48 (%)	P Value
Smoking	3 (6.3%)	2 (4.2%)	>0.99
Alcohol Intake	7 (14.6%)	5 (10.4%)	0.76
Unemployed	34 (70.8%)	31 (64.6%)	0.66
Hypertension	11 (22.9%)	5 (10.4%)	0.17
Diabetes Mellitus	0 (0%)	2 (4.2%)	0.50
HIV infection	14 (29.2%)	16 (33.3%)	0.83
Droperidol use	11 (22.9%)	14 (29.2%)	0.64
Midazolam use	1 (2.1%)	4 (8.3%)	0.36

CHAPTER 4 DISCUSSION

4.1 Frequency of pruritus

Fentanyl reduces the amount of the local anaesthetic needed in the spinal drug mixture. This leads to a reduction in the incidence of hypotension at the cost of side effects such as itchiness⁵². There was a high occurrence of pruritus (54.2%) among the participants in this study. This is comparable to high frequencies previously reported for parturient patients^{20,21,25}. In a study by researchers from Harvard Medical School, Hunt and co-workers²⁰ found that 24 of 47 participants (51.1%) who received intrathecal fentanyl developed pruritus. High oestrogen levels during pregnancy influence opioid receptors and this may be responsible for the increase in incidence of pruritus associated with pregnancy^{27,28}. Other researchers⁵³⁻⁵⁶ have reported lower incidences (0-27.8%) than were found in this study. Intrathecal fentanyl was used in three of these studies and sufentanil in the fourth study. Unlike this study where the main outcome was pruritus, the main outcome of these studies was to assess the quality and duration of analgesia during caesarean section and postoperatively, with side-effects including pruritus as secondary outcomes. The numbers of participants in the studies were small, with 20 participants each in two of the studies and 30 participants in the third that used fentanyl. In the study in which pruritus was not observed, lignocaine was combined with fentanyl, and this may be responsible for that result.

Pruritus developed intraoperatively in 48 of the 52 (92.3%) women that had pruritus, with no additional participants reporting the symptom at more than one hour after administration of spinal anaesthesia. Almost all cases of pruritus developed intraoperatively in all the studies that used

fentanyl, or sufentanil intrathecally. Pruritus from morphine in one meta-analysis⁴³ tended to occur postoperatively. This is useful information for anaesthetists, to anticipate pruritus as a side-effect. Also, the finding that almost all fentanyl induced pruritus presents intraoperatively with few new cases later is further useful information for counselling patients on the side-effects of fentanyl used for spinal anaesthesia.

4.2 Site of pruritus

The nose was the most common site of pruritus followed by the upper face. The distribution and sites of itching in this study are similar to those found in other studies^{21,22,25,26,53}. The distribution corresponds to the areas innervated by the trigeminal nerve. The 'itch centre', which is rich in opioid receptors, is found near the nucleus of the trigeminal nerve, and the rapid rostral spread of fentanyl in the spinal cord is responsible for spread of analgesic to the nucleus. In a study from Singapore⁵³, pruritus caused by fentanyl affected only the nose and face, while that caused by sufentanil affected the face as well as the upper body. This study found pruritus affecting the neck in 4 participants (4.2%), and in the upper torso in 15 (15.6%) intraoperatively.

The onset of pruritus occurred soon after sensory blockage was achieved. In a study to determine the distribution, clearance and kinetics of intrathecally administered morphine, fentanyl, alfentanil and sufentanil, Ummenhofer and co-workers⁵⁷ found a low integral exposure of the spinal cord to fentanyl because of its rapid distribution in the cord, cerebrospinal fluid, epidural space and fat, and its rapid diffusion into the blood. The rapid distribution of fentanyl and its rapid clearance from the cerebrospinal fluid support the findings in this study that no new cases of pruritus were found after an hour of spinal administration of fentanyl. It may be suggested that observation for pruritus from intrathecal fentanyl should be done intraoperatively and in the immediate postoperative period,

probably up to the time of return of motor function. The sites of pruritus can be well visualized by the anaesthetist who is usually at the head end of the operating table during caesarean section, and the observation of scratching in the face will lead to evaluation of the patient for need of treatment.

4.3 Relationship between dose of fentanyl and pruritus

There was no relationship between the dose of fentanyl used and the development of pruritus in this study. In the study from Harvard²⁰ no dose response was observed for pruritus with doses of fentanyl from 2.5 mcg to 12.5 mcg, which is similar to what was found in this study. However, with doses of 25 mcg and 50 mcg of fentanyl, a dose response to the side effect of pruritus was observed in that study. The maximum dose in this study was 22 mcg. The rapid clearance of fentanyl from the spinal cord could be responsible for this observation⁵⁷. Furthermore, this finding can be explained by the multiple mechanisms by which opioids cause pruritus when given intrathecally²⁹⁻³¹. A larger sample size or a study using estimations of the level of drug at various sites or its metabolites would be of value to further our knowledge of the pharmacokinetic and pharmacodynamic mechanisms involved in the occurrence of pruritus following intrathecal use of fentanyl.

4.4 Severity of spinal fentanyl induced pruritus

In the majority of women affected by pruritus, the symptom was mild and tolerable, although 4 of the participants reported that the pruritus they experienced was more than they could tolerate and 2 of them reported it as being unbearable. However, they did not verbalize this spontaneously and the severity of the symptom was noted through their actions. Treatment was given to these 2 participants. Similar to this study, treatment has been found to be necessary in only about 1% of patients who developed opioid induced pruritus^{51,53}. It is known that other factors such as boredom, anxiety, mental distraction and other skin sensations can either increase or reduce the sensation of

itching^{58,59}. Studies^{20,21,53-56,60,61} and meta-analyses^{43,62} show pruritus from intrathecal administration of opioids to be mild and self-limiting, needing treatment in less than 1% of cases. In all these studies participants were observed for 24 hours. Belzarena⁶⁰ in Livramento in Brazil, similar to Hunt et al²⁰, found pruritus to be severe with 50 mcg and 75 mcg of fentanyl. These doses are high and were used in these studies to determine the minimal effective dose of intrathecal fentanyl that will give adequate surgical anaesthesia. In Helsinki Finland, Sarvela et al⁶¹ assessed itching at 2 hours, 3 hours, and again at 24 hours after spinal anaesthesia with fentanyl and morphine as the opioids in their participants. In their study the occurrence of itching peaked at 2 and 3 hours after spinal anaesthesia. The nature of the side-effects was explained to the participants prior to their operation and was specifically asked, perhaps resulting in their finding of a high incidence of pruritus with most cases being mild, requiring no medication.

When the participants were observed scratching themselves, and an open ended question such as: ‘is everything all right?’ was asked, this usually led to a reply that everything was fine except for a sensation of itchiness which the participants justified by giving their own reasons as to why they were scratching themselves. Some claimed to have felt an insect crawling over their face and others felt as if an insect bit them. In one study⁵⁴ it was emphasized that pruritus has to be looked for by direct questioning. This again underscores the mild nature of this side effect in most patients. The wide range of grading of this symptom shows that there may be individual-related factors that affect the sensation as well as the degree to which it can be tolerated. To determine these factors, including cultural influences, further studies would be needed with large numbers of participants to elucidate the influence of factors impacting on the frequency of this side effect.

4.5 Predisposing factors

The incidence of pruritus in this study did not correlate with level of education, ethnicity, employment status, clinical conditions and medications. This study was however not powered to assess these associations. No report so far has implicated any of these as predisposing factors for pruritus following intrathecal fentanyl use. This will need further exploration.

4.6 Limitations of the study

A limitation of this study was that the sample size was only calculated for the main outcome, which was pruritus. The sample size may have been inadequate to study the influence of age, level of education, ethnicity or employment status, and clinical factors on intrathecal opioid-induced pruritus. The administration of other drugs such as droperidol, preparations used for cleaning the surgical site, and oxytocin could have influenced the results. It was not possible to identify the individual effects of antibiotics, antiretroviral and antihypertensive drugs as these were not recorded consistently in the case-notes and therefore were not included for data collection. For some of the participants, the need to obtain pain relief, or anxiety and fear might have influenced the responses to the questions they were asked.

CHAPTER 5 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study confirmed that itching occurs in obstetric patients at Chris Hani Baragwanath Academic Hospital delivered under spinal anaesthesia using a combination of bupivacaine and fentanyl. The frequency of this pruritus is high. The parts of the body frequently affected causing discomfort from scratching are the face and upper body. The pruritus may occasionally be severe. This pruritus usually started intraoperatively, but in the majority of cases was transient and not severe enough to necessitate treatment. Evidence of pruritus has to be looked for by direct questioning by the anaesthetist.

Intrathecal administration of fentanyl with bupivacaine provides anaesthesia and analgesia to perform caesarean section on a haemodynamically stable patient. Delivery by caesarean section under spinal anaesthesia offers a warm emotional environment, which allows early bonding as part of a baby-friendly initiative in Chris Hani Baragwanath Academic Hospital. Yet, pruritus remains a common, albeit mild, side-effect.

5.2 Recommendations

The high incidence of pruritus at caesarean section in this hospital needs to be brought to the attention of all healthcare providers caring for patients given opioids neuraxially so that their patients can be adequately counselled. The problem is transient, almost always needing no treatment other than reassurance. The more effective drugs are costly and may not be necessary.

The drugs used in treating intrathecal opioid induced pruritus add a cost that state hospitals, such as Chris Hani Baragwanath Academic Hospital need to evaluate through studies to ascertain their effectiveness before recommending their use. Until the results of such studies are available, the patients should be allowed to scratch their nose and upper part of the body, should this symptom occur any time after spinal insertion.

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APPENDICES

APPENDIX A: Patient information leaflet and informed consent

Appendix B: Data collection sheet

Appendix C: Approval from the Ethics Committee of the University of Witwatersrand

Appendix D: Permission from Chris Hani Baragwanath Academic Hospital

**Appendix E: Protocol on spinal anaesthesia used in the Department of
Anaesthesiology at Chris Hani Baragwanath Hospital**

Appendix A: Patient information leaflet & Informed consent

Incidence and severity of pruritus in patients delivered by caesarean section under spinal anaesthesia in Chris Hani Baragwanath Hospital

Study Doctor: Dr K Mwinyoglee

Participant study number:.....

Good day,

I am Dr Kony Mwinyoglee. I am a specialist anaesthetist. I am doing a research project to achieve a master's degree (MMed) with Wits University. I am inviting you to participate in this project. This form has information to help you decide if you want to take part. Read carefully and feel free to ask me or any staff member for assistance.

What is the project about?

You need to have an operation in order to take the baby out, for a medical or obstetric reason. The internationally advocated method of giving you anaesthesia for this operation is to do a spinal. A spinal anaesthetic is where we use a very thin needle to inject a small amount of drug into your back. The anaesthetic then makes your legs and the lower part of your body numb. Once your body is numb, we are able to operate on the part that needs the operation without you feeling any pain.

All information will be kept confidential by using a code, for example, a number instead of your name.

You will not be identified in any presentation or publication. You are free to participate or not in this study and should you choose to participate or not, you will in no way be treated any differently than normal. If you choose to participate, you may at any later stage decide that you would like not to be in this study and you may be taken out of the study and this will in no way alter the treatment you will receive.

treated any differently than normal. If you choose to participate, you may at any later stage decide that you would like not to be in this study and you may be taken out of the study and this will in no way alter the treatment you will receive.

Why have I been chosen to participate?

You have been chosen because you have come to deliver at our hospital and we hope this study will give useful information to help us give women good care in pregnancy.

What exactly will be done to me?

You will be given a spinal anaesthetic for caesarean section delivery in the usual way and you will be asked about what you experienced following the spinal anaesthetic.

How do I gain by participating in this project?

You do not gain directly. This is a research project to improve patients' experience of delivery by caesarean section under spinal anaesthesia. You will not receive any reward for agreeing to participate in this project.

Will there be any harm to my baby or me if I participate?

Our standard protocol for spinal anaesthesia will be used and there should be no direct harm to you or your baby.

Could the information obtained about me end up in the wrong hands?

No everything I find out about you is confidential. You will be allocated a study number and I will be the only person to know that this study number is yours.

What will happen if I do not want to participate?

Nothing even if you sign the consent form to participate, and then change your mind later, it will not affect the way you are treated by doctors and nurses here.

Who can I speak to if I have questions regarding the research even after I leave the Hospital?

If you have any questions about the research, you may ask your doctor or nurse or speak to me directly on **072 418 4763**.

You may also call:

- My research supervisors: Professor E Buchmann on **011 933 8155** and Professor C Lundgren on **011-933 9560**,
- The Ethics Chairman: Professor Cleaton Jones on **011 717 1234**.

APPENDIX A: INFORMED CONSENT FORM

I, the undersigned, agree to be part of the study explained to me. I hereby confirm that I have been informed by Dr K. Mwinyoglee about the nature, conduct, benefits and risks of this clinical study: “Incidence and severity of side effects in patients delivered by caesarean section under spinal anaesthesia in Chris Hani Baragwanath Hospital, protocol number M91104.”

I have also received, read and understood the above written information contained in the patient information leaflet. I am aware that the results of the study, including personal details regarding my age, date of birth, name and diagnosis will be anonymously processed into a study report.

In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system.

I have had sufficient opportunity to ask questions and of my own free will declare myself prepared to participate in the study.

PARTICIPANT:

PRINTED NAME

SIGNATURE / THUMB PRINT

DATE AND TIME

.....

.....

.....

I, DR K. MWINYOGLEE, HEREWITH CONFIRM THAT THE ABOVE PARTICIPANT HAS BEEN FULLY INFORMED ABOUT THE NATURE, CONDUCT AND RISK OF THE ABOVE STUDY.

STUDY DOCTOR:

PRINTED NAME

SIGNATURE / THUMB PRINT

DATE AND TIME

.....

.....

.....

**TRANSLATOR / OTHER PERSON EXPLAINING INFORMED
CONSENT**

(DESIGNATION).....

PRINTED NAME

SIGNATURE / THUMB PRINT

DATE AND TIME

.....

.....

.....

WITNESS:

PRINTED NAME

SIGNATURE / THUMB PRINT

DATE AND TIME

.....

.....

.....

APPENDIX B: Data collection sheet

Date

Study no.

PARTICIPANT INFORMATION:

PATIENT DEMOGRAPHICS

- Ageyears old
- Race
 - White Yes / No
 - Coloured Yes / No
 - Indian Yes / No
 - African Yes / No
 - Zulu Yes / No
 - Tswana Yes / No
 - Sotho Yes / No
 - Pedi Yes / No
 - Venda Yes / No
 - Xhosa Yes / No
 - Others Yes /No
- What is your level of education?
 - Primary Yes / No
 - Matric Yes / No
 - Post matric level Yes / No
- Do you smoke? Yes / No
- Do you drink alcohol? Yes / No
- Are you employed? Yes / No
- Indication for caesarean section:
- State day and time :

- **Do you suffer from any of the medical problems below?**

- | | |
|------------------|----------|
| ➤ Asthma | Yes / No |
| ➤ Liver disease | Yes / No |
| ➤ Kidney disease | Yes / No |
| ➤ Heart disease | Yes / No |
| ➤ Epilepsy | Yes / No |
| ➤ Others | Yes / No |

Medication used before caesarean section

Medication used	Yes / No
-----------------	----------

- **If Yes what medication?**

- | | |
|---------------------------|----------|
| ➤ Antihypertensive drugs | Yes / No |
| ➤ Antibiotic drugs | Yes / No |
| ➤ Magnesium sulphate | Yes / No |
| ➤ Anti-retroviral drugs | Yes / No |
| ➤ Anti-epileptic | Yes / No |
| ➤ Anti-asthmatic | Yes / No |
| ➤ Anti – depressant drugs | Yes / No |

Dose of fentanyl :

.....

All drugs given intra-op:

.....

.....

.....

.....

How are you feeling ?

.....

POST-OP ASSESSMENT: ONE HOUR POST-OP.

1. Direct observation of patient intraop: itching Yes / No

2. Open question: Is everything all right ?.....

3. Interview: Did you experience any of the following ?

- Nausea Yes / No
- Vomiting Yes / No
- Shortness of breath Yes / No
- Itching Yes / No

Did the itching occur on:

- The upper lip only Yes / No
- The lower lip only Yes / No
- The nose only Yes / No
- The lower part of the face only Yes / No
- The upper part of the face only Yes / No
- The whole face Yes / No
- The neck only Yes / No
- The face and neck only Yes / No
- The chest only Yes / No
- The upper part of the body Yes / No
- The whole body Yes / No

Did you complain about this itchiness to anyone ? Yes / No

To whom did you complain ?

- Sisters Yes / No
- Doctors Yes / No
- Others Yes / No

Was any medication given to you? Yes / No

Was the medication helpful? Yes / No

How long did the itchiness last?

➤ Few minutes Yes / No

➤ One hour Yes / No

➤ Less than 2 hours Yes / No

➤ More than 2 hours Yes / No

POST-OP INTERVIEW: DAY ONE POST-OP.

Did you experience any of the following ?

- | | |
|-----------------------|----------|
| ➤ Nausea | Yes / No |
| ➤ Vomiting | Yes / No |
| ➤ Shortness of breath | Yes / No |
| ➤ Itching | Yes / No |

Did the itching occur on:

- | | |
|-----------------------------------|----------|
| ➤ The upper lip only | Yes / No |
| ➤ The lower lip only | Yes / No |
| ➤ The nose only | Yes / No |
| ➤ The lower part of the face only | Yes / No |
| ➤ The upper part of the face only | Yes / No |
| ➤ The whole face | Yes / No |
| ➤ The neck only | Yes / No |
| ➤ The face and neck only | Yes / No |
| ➤ The chest only | Yes / No |
| ➤ The upper part of the body | Yes / No |
| ➤ The whole body | Yes / No |

Did you complain about this itchiness to anyone ? Yes / No

To whom did you complain ?

- | | |
|-----------|----------|
| ➤ Sisters | Yes / No |
| ➤ Doctors | Yes / No |
| ➤ Others | Yes / No |

Was any medication given to you? Yes / No

Was the medication helpful? Yes / No

How long did the itchiness last?

- Few minutes Yes / No
- One hour Yes / No
- Less than 2 hours Yes / No
- More than 2 hours Yes / No

Did the anaesthetic doctor inform you about the possibility of:

- Headache Yes / No
- Nausea Yes / No
- Vomiting Yes / No
- Itchiness Yes / No

before the operation?

Person who administered the spinal anaesthesia:

- Consultant Yes / No
- Registrar in anaesthesia Yes / No i.e. years in rotation:.....
- Diploma in anaesthesia Yes / No
- Medical officer / Principal Medical Officer Yes / No
- Intern Yes / No

Patient satisfaction with spinal anaesthesia Yes / No

APPENDIX C: Ethics approval document

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Dr Kony M Mwinyoglee

CLEARANCE CERTIFICATE

M091104

PROJECT

Incidence and Severity of Pruritus in Patients
Delivered by Caesarean Section under
Spinal Anaesthesia in CH Baragwanath
Hospital

INVESTIGATORS

Dr Kony M Mwinyoglee.

DEPARTMENT

Department of Anaesthesia

DATE CONSIDERED

2009/11/27

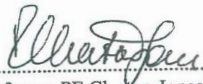
DECISION OF THE COMMITTEE*

Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 2009/12/20

CHAIRPERSON


(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Prof E Buchmann

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and ONE COPY returned to the Secretary at Room 10004, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. I agree to a completion of a yearly progress report.

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

APPENDIX D: Permission from Chris Hani Baragwanath Academic Hospital

PERMISSION TO CONDUCT RESEARCH AT CHRIS HANI
BARAGWANATH HOSPITAL

PRINCIPAL RESEARCHER:

FULL NAME KONY MWINYOGLEE
DESIGNATION SPECIALIST ANAESTHETIST
CONTACT NUMBER 072 41 84 763
EMAIL marlis@iburst.co.za

DEPARTMENT/S ANAESTHESIA

HEAD/S OF DEPARTMENT/S PROFESSOR C. LUNDGREN

TITLE OF RESEARCH INCIDENCE AND SEVERITY OF
PRURITUS IN PATIENTS DELIVERED BY
CAESAREAN SECTION AT CHRIS HANI-BARAGWANATH HOSPITAL

OBJECTIVES OF RESEARCH

1. TO ASSESS THE INCIDENCE OF PRURITUS IN PATIENTS WHO
RECEIVED SPINAL ANAESTHESIA FOR CAESAREAN SECTION.
 2. TO ESTABLISH THE SEVERITY OF SYMPTOMS INDUCED PRIOR
IN THE ABOVE GROUP OF PATIENTS.
 3. TO ESTABLISH ANY PATIENTS FACTORS SUCH AS AGE, RACE, SEX, SOCIO-
ECONOMIC STATUS, LABOUR, AFFECTING THE PERCEPTION OF
SYMPTOM.
- STUDY SITE/S CHRIS HANI-BARAGWANATH HOSPITAL
OBSTETRIC AND Gynaecology DEPARTMENT

BRIEF OUTLINE OF METHODOLOGY

THIS WILL BE A PROSPECTIVE OBSERVATIONAL STUDY.
18 YEARS OLD AND ABOVE ASA I AND II PATIENTS WILL BE
ELIGIBLE FOR THE STUDY.
STANDARD ANAESTHESIA AS PER DEPARTMENTAL PROTOCOLS
WILL BE USED. PATIENTS WILL BE OBSERVED AND INTERVIEWED.
EXPECTED START DATE 01-12-2009 EXPECTED DURATION ONE MONTH FOR SYMPT

ETHICS CLEARANCE? Y / N / PENDING

CONFLICTS OF INTEREST? Y / N DETAILS _____

COSTS TO HOSPITAL AND/OR PATIENTS? Y / N

SOURCE OF FUNDING NOT APPLICABLE

PERMISSION GRANTED? Y / N

SIGNATURE [Signature] NAME IN PRINT DR E. OMONBA-SCE

MEDICAL SUPERINTENDENT PO. BERTSHAM 2013, KSA 2009-10-30 CHRIS HANI BARAGWANATH HOSPITAL

APPENDIX E: Departmental protocol on spinal anaesthesia in obstetrics

OPTIONS FOR INTRATHECAL INJECTIONS FOR CAESAREAN SECTION

OPTION 1

2.5ml heavy bupivacaine (0.5%)

Use premixed, or mix 2.25ml bupivacaine with 0.25ml 50% dextrose.

OPTION 2

2.0ml volume, with heavy bupivacaine and fentanyl 12-20µg

Using a 20ml syringe, draw up 16ml of heavy bupivacaine. Add 1-2amps (100-200µg) fentanyl.

If you added 1 amp (total 18ml), then a 2.0ml spinal will contain 8.88mg of bupivacaine, and 11.11µg of fentanyl.

If you added 2 amps (total 20ml), then a 2.0ml spinal will contain 8mg of bupivacaine, and 20µg of fentanyl.

SOME INFORMATION

Adding fentanyl to intrathecal bupivacaine improves both the **quality** and **duration** of the block. It allows for lower doses of bupivacaine to be used, thus decreasing the **haemodynamic** effects of the sympathetic block achieved by bupivacaine alone.

Concerns regarding the use of fentanyl relate to its side effects. There may be **pruritus** (usually limited to the nose, for some reason, and for a short period only), **nausea/vomiting** (which is minimal with doses below 50µg, and a lot less of a problem than the nausea associated with hypotension), and there is always a concern about **respiratory depression**. Intrathecal doses of up to **20µg** have repeatedly been found to be **safe**, and patients are not required to be monitored postoperatively for longer than the usual recovery period.



Dr P Penfold
Senior Consultant #6722
Obstetric Anaesthesia