A COMPARATIVE STUDY ON THREE DOSES OF MORPHINE ADDED TO HYPERBARIC BUPIVACAINE IN SPINAL ANAESTHESIA

Dissertation submitted in partial fulfillment of

M.D. DEGREE EXAMINATION

M.D. ANAESTHESIOLOGY- BRANCH X

CHENGALPATTU MEDICAL COLLEGE, CHENGALPATTU

THE TAMILNADU DR .M.G.R. MEDICAL UNIVERSITY

CHENNAI, TAMILNADU

APRIL 2013

CERTIFICATE

This is to certify that this dissertation titled **"A COMPARATIVE STUDY ON THREE DOSES OF MORPHINE ADDED TO HYPERBARIC BUPIVACAINE IN SPINAL ANAESTHESIA"** has been prepared by **Dr. D. Dinesh** under my supervision in the Department of Anaesthesiology, Chengalpattu Medical College & Hospital , Chengalpattu during the academic period 2010-2013 and is being submitted to The Tamil Nadu DR. M. G. R. Medical University, Chennai in partial fulfillment of the University for the award of the Degree of Doctor of Medicine (Branch X-MD Anaesthesiology) and his dissertation is a bonafide work.

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DECLARATION

I, **Dr. D. Dinesh**, solemnly declare that the dissertation **"A COMPARATIVE STUDY ON THREE DOSES OF MORPHINE ADDED TO HYPERBARIC BUPIVACAINE IN SPINAL ANAESTHESIA"** is a bonafide work done by me in the Department of Anaesthesiology, Chengalpattu Medical College & Hospital, Chengalpattu, after getting approval from the Ethical committee under the able guidance of Prof. Dr. V. JAYARAMAN M.D.D.A., Professor & HOD, Department of Anaesthesiology , Chengalpattu Medical College , Chengalpattu .

Place : Chengalpattu

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Dated:24.03.2011

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Ref: 1) Application dated: 21.01.2011 of the Individual.
2) Letter dated 21.01.2011 of the Head of the Department of Anaethesiology, Chengalpattu Medical College, Chengalpattu.

...

Dr.D.Dinesh, Post Graduate Student in M.D.(Anaethesiology) of this college has submitted a Dissertation for the study work entitled "entitled **"Dose-Response Relationship for Three Doses of Intrathecal Morphine added to 0.5% heavy Bupivacaine"**. The study of the above Dissertation Work of the above Individual has been approved by the Human Ethical Committee of the Chengalpattu Medical College, Chengalpattu which is forwarded herewith for further course of action.

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INTRODUCTION

In ancient ages pain was thought to be an emotion rather than a sensory modality. Pain control was a function of religious authorities and shamans in primitive cultures, and relief of pain was sought through incantations and prayers. Pain was then often considered to be a punishment for committed sins or a form of religious suffering. The word pain is derived from the Greek term “poine” (penalty)[18]. Aristotle thought that pain was an emotion emanating from the heart, but Galen correctly observed that the brain was required for pain to be manifested in animals.

Sulfuric ether, a compound was synthesized from sulfuric acid and alcohol by the chemist Valerius Cordus (1515-1544). Cordus called the flammable, volatile liquid “sweet vitriol,” and in 1740, Frobenius named it ether (from the Greek word for “ignite” or “blaze”).

The idea of specific neural pathways for painful sensations began with Charles Bell (1774-1842) and Francois Magendie (1783-1855), who both demonstrated that the dorsal roots transmitted sensory information and that the ventral roots contained the motor nerves. The evidence that pain was a separate and distinct sense with separate end organs was formulated in 1858 by Moritz S. Schiff (1823-1896).

Another inhaled technique, the soporific sponge was used in the Middle Ages. Inhalation of soporific sponge made patients sleep, and so the patients do not feel the pain of cutting. Ingredient of sponge : opium one half ounce, mandragora the juice from the leaves eight ounces, the juice of fresh hemlock hyposcyanus three ounces of the juice all three added to water to form a liquor, then absorbed in a fresh dry sponge and dried it. This sponge was dipped in warm water, placed over the nose and made the patient to breathe deep till the time he was asleep. After surgery to wake him up, another sponge soaked with vinegar was applied to his nose.

After Morton introduced ether anaesthesia during 1846, Sir August Bier first started using cocaine for spinal anaesthesia in 1898. Racoviceanu - Pitesti, was the first one who presented his reports on opioids for spinal anaesthesia at Paris in 1901. Endogenous opioids, first discovered in 1974 by A. Goldstein and later confirmed by J. Hughes in 1975 and S. H. Snyder and coworkers in 1977, are located at diverse sites in the pain pathway, including the dorsal horn, and they can influence the rostral transmission of pain sensations. Several modalities of pain therapy, such as acupuncture and biofeedback, attempt to activate these endogenous systems to suppress chronic pain syndromes.

Epidural use of morphine for treating pain was first documented by Behar and his colleages in 1979.

Spinal and Epidural opioids are now part of a routine regimen for intraoperative and postoperative pain relief.

Intense noxious input from the periphery may also result in central Sensitization which is termed as persistent post injury changes in the CNS that result in hypersensitivity to pain and an exaggerated and prolonged responsiveness of neurons to normal afferent input after damage to the tissue.

Such noxious input may lead to functional changes in the dorsal horn of the spinal cord and other consequences that may later cause postoperative pain to be perceived as more painful than it would otherwise have been.

The effects include sodium, water retention and increased levels of blood glucose, ketone bodies, and lactate. A hypermetabolic, catabolic state occurs as metabolism and oxygen consumption are increased and metabolic substrates are mobilized from storage depots. Attenuation of the stress response and postoperative pain may facilitate and accelerate the patient's recovery postoperatively. The stress response may be an

important factor in the postoperative development of hypercoagulability which may contribute to an elevated incidence of postoperative hypercoagulable - related events such as deep venous thrombosis, vascular graft failure, and myocardial ischemia.

The stress response may also potentiate postoperative immuno suppression, the extent of which correlates with the severity of surgical injury. Hyperglycemia from the stress response may contribute to poor wound healing and depression of immune function. Activation of the sympathetic nervous system may also delay return of postoperative gastrointestinal motility, which may develop into paralytic ileus.

Thus effective treatment of postoperative pain is a part of anaesthesiologist care in recovery of the patients postoperatively.

Opioids were the first clinically used selective spinal analgesics after opioid receptors were discovered in the spinal cord. They have been shown to enhance the quality of local anaesthetic induced subarachnoid block and to provide postoperative analgesia and also reduce the dose of local anaesthetics and the side effects and hence this study.

SPINAL ANAESTHESIA

The discovery of neuraxial anesthesia was born out of mishap in 1885 when Corning was experimenting with effects of cocaine on the spinal nerves of dogs. Bier brought spinal anesthesia into clinical use for surgery in 1898, but only after self -experimentation and a personal experience with a well-described postdural puncture headache.

Intrathecal anaesthesia is the commonly used and preferred anaesthetic technique used for abdominal, perineal, gynaecological and lower limb Surgeries. It offers excellent anaesthesia with fewer side effects than general anaesthesia. It is very easy to perform and provides faster onset and effective sensory and motor block.

Bupivacaine is the commonly used local anaesthetic in spinal anaesthesia. It gives long lasting anaesthesia with fewer side effects and no transient neurological symptoms which occurs when lignocaine is used.

Nowadays there has been interest in using additives to spinal local anaesthetics so that the dose of the local anaesthetic is decreased and also provide effective postoperative pain relief.

Spinal (Intrathecal / subarachnoid) Anaesthesia is a type of Central neuraxial blockade where temporary interruption of nerve transmission is accomplished by injection of only local anaesthetic or with addition of adjuvants to local anaesthetics in subarachnoid space.

Spinal anaesthetics exert their sensory block at the spinal cord, which is continuous cephalad with the brainstem through the foramen magnum and terminates distally in the conus medullaris.

ANATOMY

The vertebral canal extends from foramen magnum to the sacral hiatus. The boundaries are the dorsal spine, pedicles and laminae of successive Vertebra - cervica l-7, thoracic-12, lumbar-5, sacral - 5.

The various ligaments attached to the vertebra which provide support to the vertebra and also the boundaries of the spinal canal are : anterior and the posterior longitudinal ligaments, ligamentum flavum, interspinous ligament, supraspinous ligament.

The spinal cord is a direct continuation of medulla oblongata and it begins at the upper border of atlas and terminates caudally in the conus medullaris.

The spinal cord end at the level of L3 in the infant and due to differential growth rate between the bony vertebral canal and spinal cord, the spinal cord ends at the level of L1 in adults.

Three membranes surround the spinal cord (from within to periphery): the pia mater, arachnoid mater and the dura mater.

The pia mater is a highly vascular membrane that closely invests the spinal cord.

The arachnoid mater is nonvascular delicate membrane that closely attach to the outermost layer of the dura.

The arachnoid mater functions as a barrier to the drugs in and out of CSF.

The subarachnoid space contains the CSF, spinal nerves, trabecular network between the two membranes, and blood vessels that supply the spinal cord, lateral extensions of the pia mater and the dentate ligament. Subarachnoid space ends at S2 in adults.

Third and outermost membrane in the spinal canal is a randomly organized fibroelastic membrane, the dura mater (or theca). This layer is a direct extension of the cranial dura mater and extends as the spinal dura mater from the foramen magnum to S2, where the filum terminale (an

extension of the pia mater beginning at the conus medullaris) blends with the periosteum on the coccyx.

EPIDURAL SPACE

Surrounding the dura mater is the epidural space that extends from the Foramen magnum to the sacral hiatus and surrounds the dura mater anteriorly laterally, and more usefully, posteriorly. The epidural space is bounded anteriorly by the posterior longitudinal ligaments, laterally by the pedicles and intervertebral foramina, and posteriorly by the ligamentum flavum.

Contents of the epidural space include the nerve roots that traverse it from foramina to peripheral locations, as well as fat, areolar tissue, lymphatics, and blood vessels, including the well-organized Batson venous plexus.

Lumbar puncture and the spinal anaesthesia is commonly performed below L2 vertebra down to the L5-S1 interspace to avoid damage to the spinal cord which ends at the level of lower border of L1 in adults.

PHYSIOLOGY OF SUBARACHNOID BLOCK

CEREBROSPINAL FLUID

The cerebrospinal fluid is an ultrafiltrate of blood which is in hydrostatic and osmotic equilibrium.CSF is a colourless, clear fluid found in spinal, cranial subarachnoid space and ventricles of brain. The volume of CSF in humans is about 150ml and the rate of CSF production is 0.3-0.4 ml/ min(550ml/day). Of the total volume 0f 150ml, 25ml is in the cerebral subarachnoid space and 75 ml is in the spinal subarachnoid space.

CSF PRODUCTION – is by the choroid plexuses of the lateral (first and second), 3rd and 4 th ventricles. It passes from the lateral ventricles to the 3rd ventricle via the foramina of Munro, and then via the aqueduct of sylvius to the 4th ventricle. From the fourth ventricle it passes to the subarachnoid spinal space via the foramina of Lushka (lateral one)and foramen of Magendie (medial one).

PHYSICAL CHARACTERISTICS OF CEREBROSPINAL FLUID[7]

pH	**7.33**
Specific gravity	**1.007**
Density	**1.003**
Baricity	**1.000**
Osmolality	**289mosm/kg H2O**
Pressure	**8-12mmHg/ 70-80cmH2O**
Protein	**20mg/dl**
Glucose	**64 mg/dl**
Chloride	**113meq/kgH2O**
Magnesium	**2.2 meq/kgH2O**

The important factor determining the spread of drugs in the subarachnoid space is the baricity of the solution. Baricity is the ratio comparing the density of one solution to the CSF. Commonly hyperbaric 0.5%Bupivacaine is used in the spinal anaesthesia.

MECHANISM OF SPINAL ANAESTHESIA

The nerve roots leaving the spinal canal are not covered by epineurium and are readily exposed to local anaesthetics within the CSF. Injection of local anaesthetics into the CSF allows access to sites of action both within the spinal cord and the nerve roots. Spinal anaesthetics

block the sodium channels in the spinal nerve roots within the dorsal and ventral horns inhibiting the generation and propagation of electrical activity.

ORDER OF BLOCKADE OF NERVE FIBRES

The order in which the nerve fibres are blocked in spinal anaesthesia is preganglionic sympathetic B fibres followed by temperature fibres (cold before warmth), fibres carrying pin prick sensation, touch, deep pressure and finally the proprioception. The recovery of nerve fibres is in the reverse order.

FACTORS DETERMING THE LEVEL OF BLOCKADE

Important factors determining the height of blockade after the subarachnoid blockade are :

CONTROLLABLE FACTORS

Baricity of the local anaesthetic solution

Posture of the patient before and after the injection

Dose of the anaesthetic (volume x concentration)

Site of injection along the neuraxis.

FACTORS NOT CONTROLLABLE

Volume of the CSF

Density of the CSF

SPINAL ANAESTHESIA – INDICATIONS

Lower abdominal surgeries

Lower limb surgeries

Urological procedures

Obstetrical & gynaecological procedures

Perineal and rectal surgeries

CONTRAINDICATIONS FOR SPINAL ANAESTHESIA

Absolute contraindication is patient refusal

Relative contraindication includes:

Local sepsis

Uncorrected coagulopathy

Raised intracranial pressure

Uncontrolled haemorrhage/ shock

Allergy to local anaesthetics

Major spine abnormalities

Fixed cardiac output states

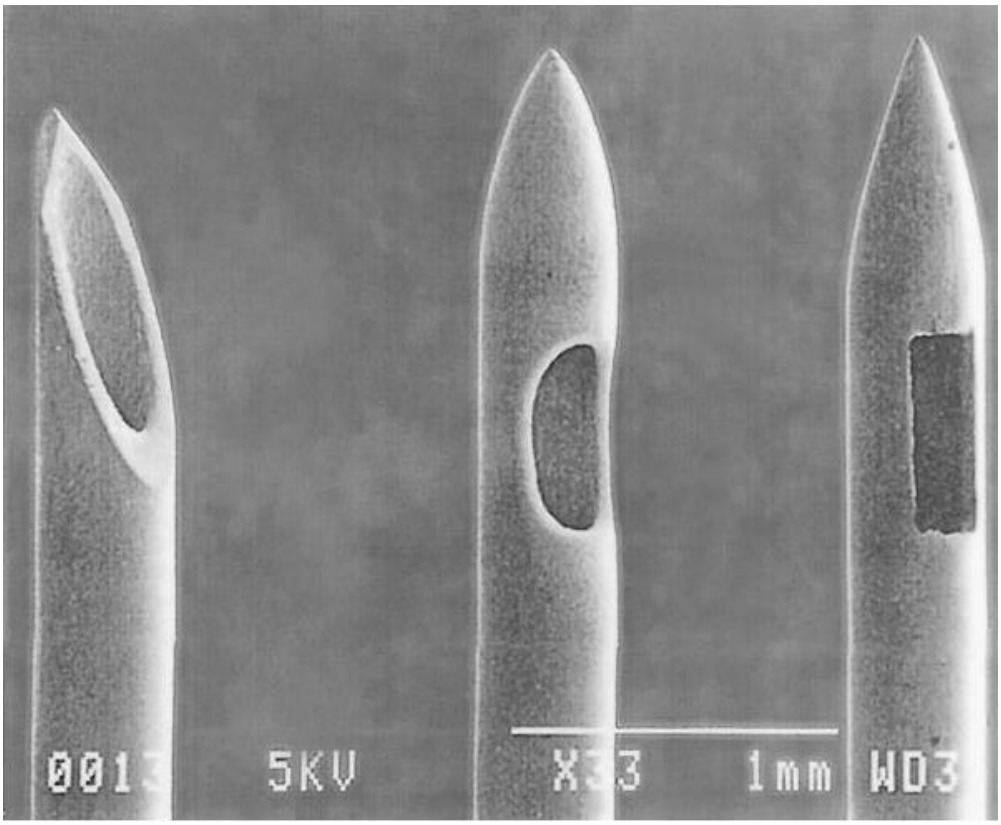
TECHNIQUE OF SPINAL ANAESTHESIA

Proper patient selection is the first step in successful application of spinal anaesthesia. This is done by pre-anaesthetic evaluation by history, physical examination, laboratory data, communication with patient and also the surgical staff about details of the procedure. Performing spinal anaesthesia needs four steps: Preparation, positioning, projection, and puncture.

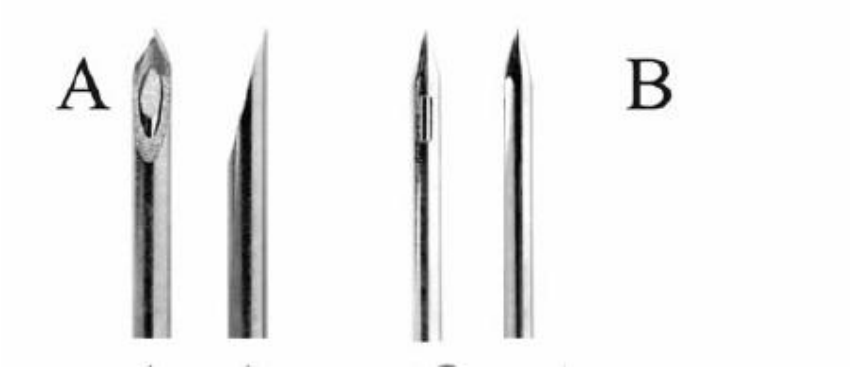
PREPARATION

Preparation of equipments and drugs is essential for performing a Spinal block. Spinal needles fall into two main categories : those that cut the dura and those with a conical tip. The former needles include the Quincke-Babcock needle, and the latter the Greene, Whitacre and Sprotte needles. In order to keep the incidence of post dural puncture headache to a minimum, small bore needles with a rounded non-cutting bevel are preferred.

SPINAL NEEDLES



QUINCKE'S NEEDLE SPROTTE WHITACRE

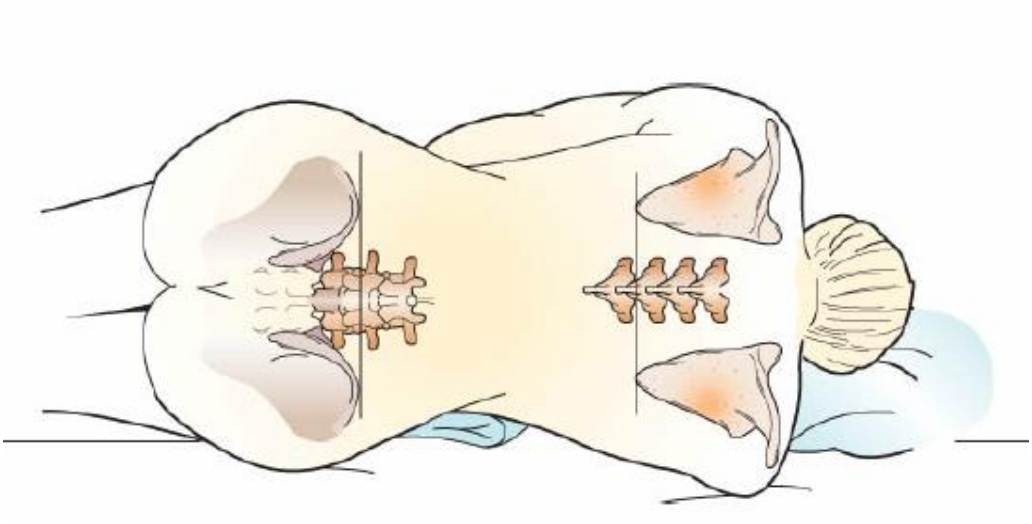


A- QUINCKE'S NEEDLE B- PENCIL POINT NEEDLES

POSITIONING OF THE PATIENT

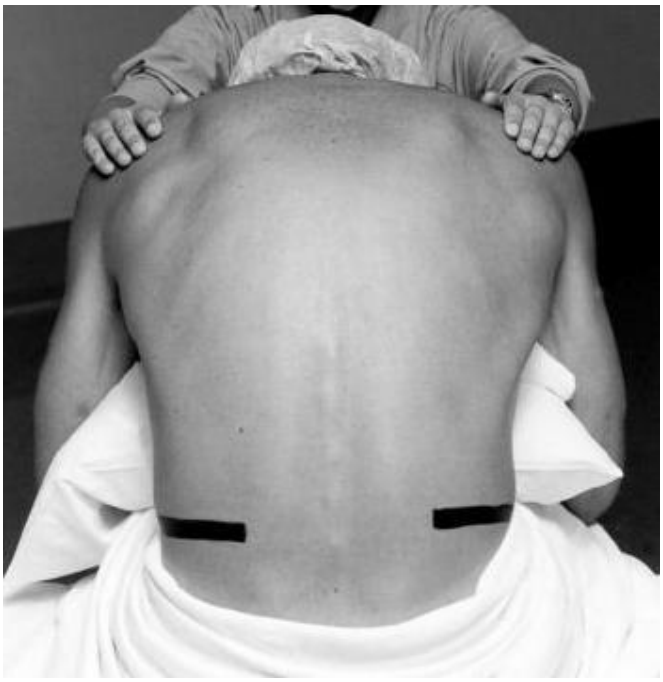
The positioning of the patient is determined by the proposed surgery being most important.

LATERAL DECUBITOUS POSITION



Patients are placed with their back parallel to the edge of the operating table, their thighs flexed on their abdomen, and their neck flexed to allow the forehead to be close to the knees.

SITTING POSITION



The sitting position choosed when low lumbar and sacral level of anaesthesia needed and also in obese patients and scoliosis in whom the identification of midline structures in decubitous position is difficult. It is also used in patients undergoing lower limb orthopaedic procedures where lateral decubitous position is difficult due to fracture pain.

PROJECTION AND PUNCTURE

After the equipments, local anesthetics and additives, and the patient have been prepared, the midline or paramedian spinal puncture

can be performed usually at the L2-3, L3-4, or sometimes the L4-5 interspace.

Midline approach is the most commonly used approach with patient in sitting or lateral position. Skin wheal is raised over the intended puncture site with local anaesthetic (mostly 2% lignocaine). Then the spinal needle is inserted in the middle of the interspace with bevel parallel to the longitudinal dural fibres. After traversing the skin, the spinal needle is advanced perpendicular to the skin.

Loss of resistance as the needle crosses ligamentum flavum appreciated, stylet removed and appearance of cerebrospinal fluid at the hub of the needle confirms correct placement of the needle tip. Hub of the needle is firmly held between the index finger and thumb of the non-dominant hand while the syringe containing the local anaesthetic solution is firmly attached to the hub of the needle.

After confirming free flow of cerebrospinal fluid by aspiration and for negative aspiration for blood, the anaesthetic solution injected. Then the patient placed in supine position. Cardiovascular and respiratory functions monitored. Analgesia checked by loss of sensation to pin prick. Motor block assessed by modified bromage score.

COMPLICATIONS OF SUBARACHNOID BLOCK

IMMEDIATE

Hypotension

Bradycardia

Toxicity due to intravascular injection

Hypoventilation(Brainstem hypoxia)

High block/Total spinal anaesthesia

LATE

Postdural puncture headache

Backache

Urinary retention

Cauda equine syndrome

Arachnoiditis

Meningitis

Anteror spinal artery syndrome

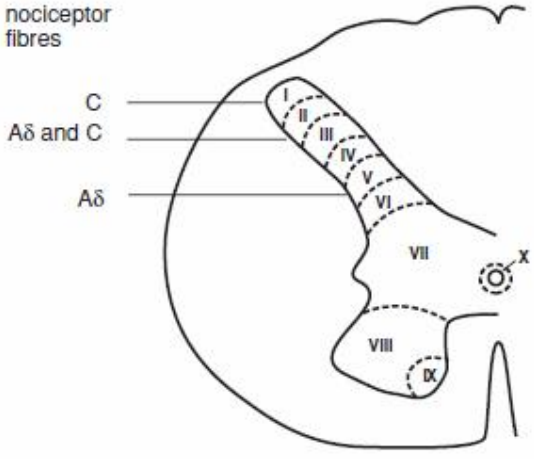
Sixth nerve palsy

PHYSIOLOGY OF PAIN

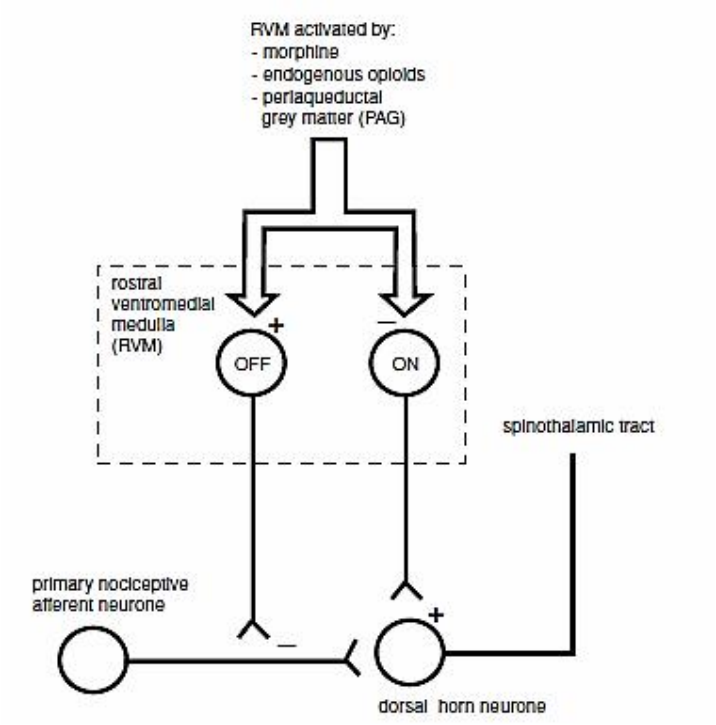
Pain is mediated by a sensory system consisting of primary afferent neurons, spinal interneurons and ascending tracts, and several supraspinal areas. Trigeminal and dorsal root ganglia give rise to high-threshold Aδ and C fibers Innervating peripheral tissues (skin, muscles, joints, viscera). These specialized primary afferent neurons, also called nociceptors, transduce the noxious stimuli into action potentials and conduct them to the dorsal horn of the spinal cord.

When peripheral tissue is damaged, primary afferent neurons are sensitized or directly activated (or both) by a variety of thermal, mechanical, and chemical stimuli.

DORSAL HORN LAMINA OF SPINAL CORD

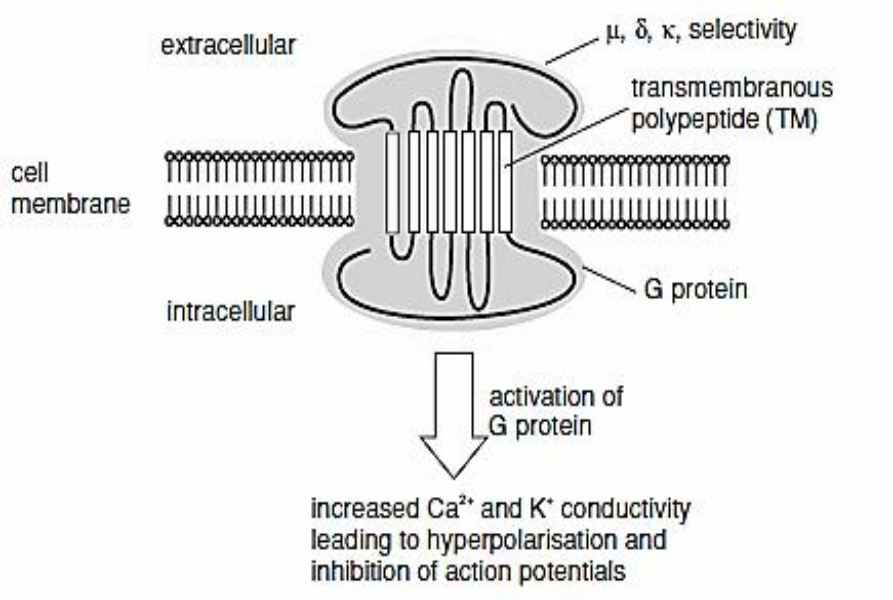


PAG–RVM AXIS IN THE DESCENDING MODULATORY SYSTEM



Opioids act to activate RVM (ROSTRAL VENTROMEDIAL MEDULLA) and this inturn inhibits dorsal horn neurone producing modulation of pain.

STRUCTURE OF OPIOID RECEPTOR



Opioids are Inhibitory modulators – suppressing nociception at various levels

Receptors	**Location**	**Action**
Opioid μ δ κ	Postsynaptic and presynaptic membranes Mesencephalon – PAG Basal ganglia – thalamus, amygdala Descending inhibitory pain system – locus coeruleus (LC)	Inhibition of dorsal horn neurones

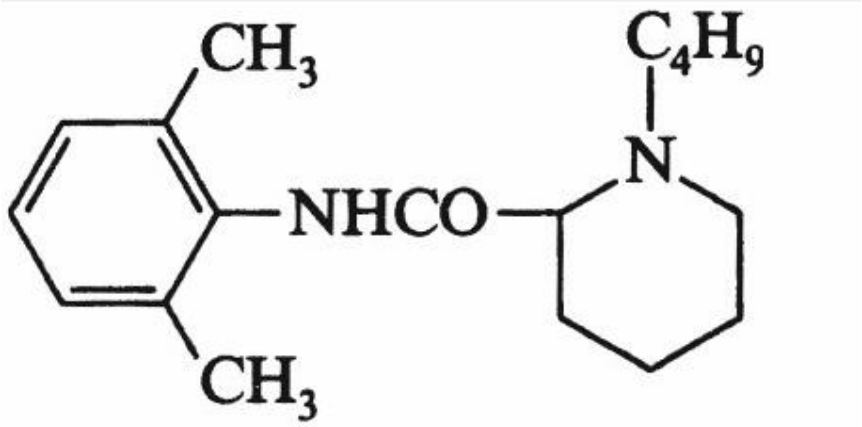
OPIOID RECEPTORS AND THEIR ACTION

	Mu (μ)	Delta (δ)	Kappa (κ)
	• Mu 1 – Analgesia • Mu 2 – Sedation, vomiting, respiratory depression, pruritus, euphoria, anorexia, urinary retention, physical dependence	• Analgesia, spinal analgesia	• Analgesia, sedation, dyspnea, psychomimetic effects, miosis, respiratory depression, euphoria, dysphoria, dyspnea
Endogenous Peptides			
Enkephalins	Agonist	Agonist	
β-Endorphin	Agonist	Agonist	
Dynorphin A	Agonist		Agonist
Agonists			
Morphine	Agonist		Weak agonist
Codeine	Weak agonist	Weak agonist	
Fentanyl	Agonist		
Meperidine	Agonist	Agonist	
Methadone	Agonist		
Antagonists			
Naloxone	Antagonist	Weak Antagonist	Antagonist
Naltrexone	Antagonist	Weak Antagonist	Antagonist

PHARMACOLOGY OF BUPIVACAINE

Bupivacaine is an amide local anaesthetic first synthesized by A.F.Ekenstam in 1957 and approved for clinical use in 1963. It is supplied for clinical use as hydrochloride salt. The specific gravity of Bupivacaine is between 1.030 and 1.035 at 25°C and 1.03 at 37°C. Spinal bupivacaine do not have any preservative. It is produced in a racemic mixture containing equal amounts of S and R enantiomers.

CHEMICAL STRUCTURE OF BUPIVACAINE



1-butyl–N–(2,6-DIMETHYLPHENYL)-2-PIPERIDINE

DECARBOXAMIDE HYDROCHLORIDE MONOHYDRATE

Physical and chemical profile of bupivacaine [3]

pKa	**8.1**
lipid solubility	**27.5**
plasma protein binding	**95%**
clearance	**0.58 l/min**
t1/2 (hrs)	**2.7**
octanol /water partition coefficient	**high**

MECHANISM OF ACTION

Bupivacaine acts by inhibiting sodium channels. It decreases and/or prevents transient increase in permeability of the cell membrane to sodium ions that follows depolarisation of the membrane. Bupivacaine also reduces the permeability of the resting nerve membrane to potassium as well as sodium ions.

PHARMACOKINETICS

Bupivacaine is rapidly absorbed from the injection site. The rise in plasma concentration of bupivacaine and peak plasma concentrations depends on the route of administration of the drug. Addition of vasoconstrictor delays absorption. Most commonly used vasoconstrictor is adrenaline. Addition of vasoconstrictor results in lower plasma concentrations of bupivacaine.

PHARMACODYNAMICS:

Metabolism of bupivacaine is by :

Aromatic hydroxylation, N dealkylation, amide hydrolysis, and conjugation. After neuraxial administration of bupivacaine, N dealkylated metabolite N – desmethyl bupivacaine has been measured in blood and urine. Liver plays an important role in degradation of bupivacaine. Renal disease unlikely to alter the pharmacokinetics of bupivacaine as only 10% of the administered drug is excreted unchanged in urine.

USES OF BUPIVACAINE:

Central neuraxial blockade:

Intrathecal

Epidural

Caudal

Peripheral nerve blocks

Infiltration anaesthesia

PREPARATIONS AVAILABLE:

0.5% solutions in 10ml and 20ml vials

5 mg/ml (0.5%) bupivacaine and 80mg dextrose in 4ml ampoules for spinal injection. **Baricity of spinal bupivacaine is 1.0207.**

DOSE TO BE USED:

Maximum permitted dose is 3mg/kg body weight.

TOXICITY OF BUPIVACAINE:

Caused by:

Unintentional intravascular injection

Overdosage

Bupivacaine toxicity affects cardiovascular system most commonly whereas lignocaine toxicity affects central nervous system.

CVS TOXICITY:

Blockade of cardiac sodium channels is responsible for the CVS toxicity.

Bupivacaine binds and inhibits cardiac voltage gated calcium and potassium Channels at concentrations greater than those required for sodium channel blockade.

Manifestation include:

Dysarrrythmias, atrioventricular block, refractory ventricular tachycardia and ventricular fibrillation.

Bupivacaine dissociates from blocked sodium channels at a much slower rate leading to prolongation of maximal rate of depolarisation (Vmax) and creating the potential for re-entrant type of ventricular arrhythmias.

CNS TOXICITY:

Excitation followed by restlessness, anxiety, dizziness, tinnitus, tremors proceeding to convulsions, coma.

ANAPHYLAXIS:

Manifests as urticaria, pruritis, angioneurotic edema.

INTRALIPID 20%

If patient experiences profound cardiovascular depression or circulatory arrest after the administration of bupivacaine, ropivacaine, or other local anesthetics, then along with initiation of basic life support and the ACLS protocol a rapid bolus of Intralipid 20%, 1.5 mL/kg (or roughly 100 mL in adults), be administered without delay, followed if necessary by an intravenous infusion of 0.25 mL/kg/min for the next 10 minutes[30].

PHARMACOLOGY OF MORPHINE:

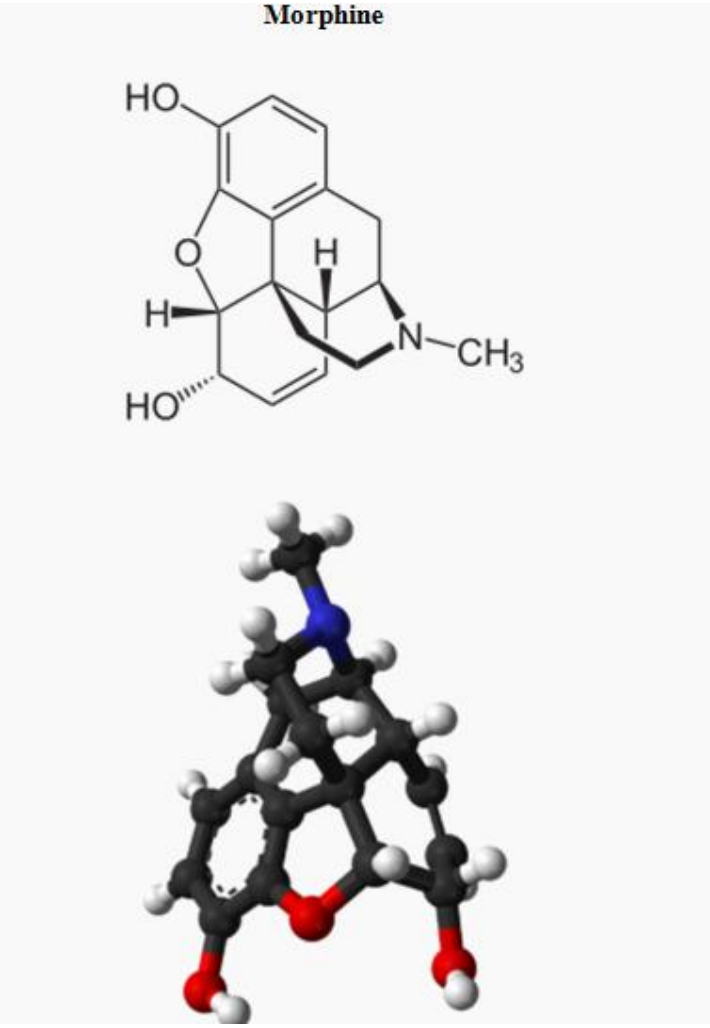
In 1806, Serturner reported the isolation of a pure substance in opium that he named morphine after Morpheus, the Greek god of dreams. It is prepared as the dried sap (latex) which is obtained from slicing the unripe seeds of the opium Papaver somniferum. Morphine was the first active principle purified from a plant source. Morphine is pharmacologically a phenanthrene derivative.

It has more affinity towards the μ-opioid receptors in the CNS. The principal pharmacological effects is on CNS and GIT. Its primary therapeutic actions are analgesia and sedation.

STRUCTURE OF MORPHINE

CHEMICAL FORMULA

$$C_{17}H_{19}NO_3$$



Physical chemistry

(5α,6α)-7,8-didehydro-4,5-epoxy-17-methylmorphinan-3,6-diol

PHYSIOCHEMICAL PROPERTIES OF MORPHINE [19]

Pka	**8**
%bound to plasma protein	**20-40**
Octanol-h2o partition coefficient	**14**
T1/2 α (min)	**1-2.5**

T1/2 β (min)	**10-20**
T1/2γ (hr)	**2-4**
Vdss(l/kg)	**3-5**
Clearance(ml/min/kg)	**15-30**
Hepatic extraction ratio	**0.6-0.8**

The density of preservative free morphine sulphate is 0.999[17]

PHARMACOLOGY:

Morphine is the prototype opioid drug and is the standard with which all the other narcotics are compared. It acts mainly at the μ receptor. These μ receptors are found all over the CNS, with high concentrations in the amygdala, thalamus, internal capsule, hypothalamus. They are also found in laminae I and II (substantia gelatinosa) of the spinal cord and in the nucleus of the trigeminal nerve.

Morphine is also a κ-opioid and δ-opioid receptor agonist, κ-opioid's action is associated with spinal analgesia, miosis (pinpoint pupils) and psychotomimetic effects.

PHARMACOKINETICS

Morphine is an hydrophilic opioid and penetrates biologic membranes more slowly than lipophilic opioids, and it is less likely to accumulate in lipid membranes or fatty tissues. The plasma

pharmacokinetics of morphine is similar to that of a fat soluble drug. It is rapidly absorbed after intramuscular, subcutaneous, or oral administration. After an intravenous bolus, plasma concentrations decline rapidly as the drug is distributed into well-perfused tissues. Only about 25–35% is bound to plasma proteins, primarily albumin. The steady-state volume of distribution is very large, and it is probably made up of nonfatty tissues.

METABOLISM [23]

Morphine is metabolised primarily in the hepatobiliary system. More than 90% of a dose of morphine is metabolized and excreted within 24 hours. The primary route of metabolism is conjugation in the liver to produce morphine 3-glucuronide and morphine 6-glucuronide. These polar metabolites are then excreted in the urine and bile. Morphine 6-glucuronide (M6G), which may constitute 15% of total morphine metabolites, possesses morphine-like analgesic and respiratory depressant activity, although higher doses are required.Not only does the metabolism occur in the liver but it may also take place in the brain and the kidneys.

SITE OF ACTION OF MORPHINE IN ANALGESIA

The analgesic effects of the opioids are due to their ability to directly inhibit the ascending transmission of the nociceptive information from the spinal cord dorsal horn which activates the pain control circuits that descend from the midbrain, via the Rostral ventromedial medulla (RVM), to the dorsal horn of the spinal cord. In the spinal cord, opioids act at synapses either presynaptically or postsynaptically. Opioid receptors are abundantly expressed in the substantia gelatinosa, where release of substance P from the primary sensory neuron isinhibited by the stimulation of the receptors.

DOSE OF MORPHINE FOR ANALGESIA

S.no	Route	Bolus	Infusion
1	Oral	30mg	
2	Im	20mg	
3	IV	10mg	0.8- 3mg/hr
4	Epidural	1-5mg	0.1-1mg/hr
5	Intrathecal	0.1-0.3mg	

PROPERTIES OF NEURAXIAL BLOCKADE

PROPERTY	MORPHINE
Onset of analgesia	Delayed onset (30-60 min)
Duration of analgesia	Longer duration (6-24 hr)
CSF spread	Extensive CSF spread
Site of action	Primarily spinal

MECHANISM OF MORPHINE AS AN ADJUVANT IN CENTRAL NEURAXIAL BLOCKADE

Spinal opioids exert analgesia by getting access into the dorsal horn of spinal cord and modulating Aδ-and C- fibers decreasing the afferent nociceptive input, inhibiting Ca influx presynaptically, and increasing the K conductance and thus hyperpolarizes ascending neurons postsynaptically. Owing to its hydrophilic nature, spinal morphine provides highly selective, prolonged spinal analgesia, but is not typically used for augmenting the intraoperative anesthesia due to slow onset of action.

Opioid receptors are present in levels I and II of the substantia gelatinosa of the dorsal horn. Opioids given either intrathecally or epidurally bind to these receptors. The dose of morphine can be decreased to 10% of the usual intravenous dose when given epidurally and to 1% when given intrathecally.

FATE OF SPINAL MORPHINE

Morphine, which is highly hydrophilic, moves through membranes more slowly and has a slower onset but longer duration, because it stays suspended in solution and is released slowly to bind to the opioid receptors. Because of its poor lipid solubility, it spreads throughout the

entire length of the spinal fluid and can help to control pain from several different anatomic sites. The termination of clinical activity of neuraxial opioids is due to vascular absorption and breakdown.

SYSTEMIC EFFECTS OF MORPHINE[25]

CENTRAL NERVOUS SYSTEM

Depressant effects:

Analgesia, Sedation, Mood and subjective Effects, Respiratory Centre, Temperature Regulating Centre, Vasomotor Centre.

- **Analgesia**

Perception of pain and reaction to it is decreased so that pain is not unpleasant or distressing.

- **Sedation**

Drowsiness and indifference to surroundings as well as to own body occurs without motor incoordination,ataxia or apparent excitement.

- **Mood and subjective effects**

Has a calming effect. Loss of apprehension, lack of initiative, inability to concentrate.

- **Respiratory centre**

Depresses respiratory centre in a dose dependant manner. Respiratory rate and Tidal volume both decreased. Neurogenic, hypercapnoeic, and later hypoxic drives to respiratory centre are suppressed.

- **Temperature regulating centre**

Depressed. Hypothermia occurs in cold surrounding

- **Vasomotor centre**

Depressed at higher doses and contributes to the fall in BP.

STIMULATORY EFFECTS

Stimulates CTZ, Edinger -westphal nucleus, vagal centre.

- **Chemoreceptor trigger zone**

Nausea and vomiting occur as a side effect. It sensitises the CTZ to vestibular and other impulses.

- **Edinger westphal nucleus**

III Nerve nucleus stimulated producing miosis as a central action.

- **Vagal centre**

Stimulated causing bradycardia.

CARDIOVASCULAR SYSTEM

Causes vasodilatation due to

1. Direct action decreasing tone of blood vessels.
2. Histamine release
3. Depression of vasomotor centre

GIT

Decreases propulsive movements, gastrointestinal secretions. Causes spasm of pyloric, ileocaecal and anal sphincters.

ENDOCRINE

Increases prolactin, growth hormone levels whereas FSH, LH, ACTH, ADH levels are decreased.

CONTRAINDICATIONS FOR MORPHINE

Respiratory depression, Liver failure, Renal failure, Biliary colic.

OPIOID ANTAGONIST:

NALOXONE:

Naloxone acts as a competitive antagonist at all opioid receptors, but it has greatest affinity for μ receptors.. An IV infusion of naloxone prevents or reverses side effects such as pruritis, urinary retention, respiratory depression associated with opioid overdose, but may also produce an unacceptable reduction in analgesia[13].

Dose of naloxone :

0.4 to 2 mg/dose IV/IM/subcutaneously. Can be repeated every 2 to 3 minutes.

Ezzat Abouleish *et al* [6] (1988) studied the effects of adding 200µg preservative-free morphine to hyperbaric intrathecal bupivacaine in 34 patients who underwent repeat caesarean section. He concluded that adding 200µg morphine with hyperbaric spinal bupivacaine for caesarean section is a safe and effective method of improving intraoperative analgesia and providing excellent and prolonged postoperative analgesia.

Sibilla C Albertazzi P, Zatelli R, Lupi G, Marchi M, Campobasso C, Farina A, Martinello R [24] (1994 oct) studied postoperative analgesia after different techniques of morphine sulphate administration given in addition to bupivacaine 15 mg during intrathecal anaesthesia for caesarean section and concluded that adding 80µg of morphine in spinal anaesthesia for caesarean section is a simple procedure that gives excellent and safe results in term of reliability, analgesic duration and safety.

Tarkkila P, Tuominen M, Huhtala J, Lindgren L [27](1998 Jan) conducted a study on two groups of 20 patients each. One group received continuous 3 in 1 femoral block in addition to spinal anaesthesia and the other received 300µg morphine added to the spinal anaesthetic solution. He concluded that the pain scores were lower in the morphine group when compared to the other group.

Kong SK et al[16] (2002 Dec) conducted a study on 36 patients undergoing abdominal surgery to know the analgesic action of spinal morphine. All patients were given spinal block with hyperbaric bupivacaine in addition to general anaesthesia. One group was given spinal morphine. They concluded that systemic analgesic requirement was lower in morphine group, cardiovascular parameters remained stable and Nausea and vomiting was the side effect for morphine group which was treated by antiemetics.

Raffaeli W Marconi G, Fanelli G, Taddei S, Borghi GB, Casati A [22](2006 july) conducted a study to assess the dose-effect response of postoperative nausea and vomiting after spinal administration of small doses of morphine (0.015mg to 0.25 mg) in 144 patients. They concluded that clinically significant analgesia was observed in patients who received spinal morphine and the occurence of minor opioid-related side-effects after spinal morphine administration does not depend on the dose, occurring with very small doses of morphine also.

Kato R et al[15] (2008) conducted a study to describe respiratory depression associated with spinal morphine in caesarean section. They retrospectively analysed the obstetric anesthesia database. In total 1915 women who were given 0.15 mg intrathecal morphine, 5

women developed bradypnea. The occurrence of severe bradypnea requiring naloxone was 1 in1915 (0.052%).

Girgin NK, Gurbet A, Turker G, Aksu H, Gulhan Nin[11] (2008 May; 20) conducted a study in 100 ASA I and II term parturients undergoing intrathecal anesthesia for caesarean section. All Parturients were classified into 5 groups who received 0.0mg, 100µg, 200µg, 300µg, 400µg spinal morphine in addition to 7.5 mg heavy bupivacaine. The groups were assessed for nausea, vomiting, and pruritus intraoperatively and at 4 four hour intervals during the first 24 hours postoperatively. They concluded that dose of 100µg spinal morphine produces pain relief comparable with doses as high as 400µg, with significantly less side effect profile.

Demiraran Y Yucel I, Akcali GE, Degirmenci E, Sezen G, Iskender A[5] (2008) conducted a study in which he compared two groups of 30 patients each undergoing knee arthroscopy under spinal anaesthesia. One group received only local anaesthetic and the other receiving 0.16 mg morphine in addition to the local anaestheic. He evaluated pain scores and need for analgesics in postoperative period and concluded that there was significant less pain score and analgesic requirement in morphine group than the other and pruritis remained the side effect in morphine group.

Siti salma G Choy Y Cet[25] (2009 March) conducted a prospective randomised study to compare morphine 100µg and fentanyl 25 µg added to hyperbaric bupivacaine in spinal block for duration of analgesia and side effects in patients undergoing caesarean section. He found there was occurrence of nausea and vomiting requiring treatment in morphine group. They concluded that the addition of 100 microgram morphine for intrathecal anaesthesia gives excellent and long lasting postoperative pain relief.

Nakamura, Hase K, Fujihara T, Ogawa T, Urabe A, Asari E yoshioka H[20] (2009 April) examined 72 patients undergoing elective cesarean section under spinal anesthesia. Patients were randomly assigned to receive, in a double-blind manner, either morphine 0.05 mg, morphine 0.1 mg, morphine 0.2 mg, or saline in 0.1 ml (control group) mixed with the bupivacaine for cesarean section. Results showed total amount of morphine during postoperative first 24 hrs using PCA was significantly higher in the control group than in 0.1 and 0.2 mg groups. The occurrence of pruritus was higher in 0.1mg and 0.2 mg groups than in the control group. In one patient in 0.2 mg group, oxygen saturation decreased below 95% postoperatively, but it was improved by oxygen inhalation. Thus concluded that intrathecal morphine 0.1 mg

gives effective pain relief with minimal side effects after cesarean section.

Gehling M Tryba M [9] (2009 June) conducted a study to find the frequency of side-effects in patients receiving spinal morphine in combination with intrathecal anaesthesia comparing with placebo treated patients. 790 patients with spinal morphine and 524 patients who received placebo were compared. The higher dose resulted in an increased risk of pruritus but not nausea or vomiting. Overall, spinal morphine did not increase the rate of respiratory depression. With a dose of less than 0.3 mg there were no increased episodes of respiratory depression than in placebo patients who received systemic analgesia with opioids.

George RB, Allen TK, Habib AS[10] (2009 Jul) conducted a study to determine the efficacy of serotonin receptor antagonists for the prevention and treatment of, nausea, pruritus and vomiting in patients receiving intrathecal anesthesia with intrathecal morphine for cesarean delivery. They concluded that prophylactic 5-HT(3) receptor antagonists reduced the severity of pruritus, occurence of postoperative nausea and vomiting, and the need for rescue antiemetic therapy.

Gehling MH, Luesebrink T, Kulka PJ, Tryba M[8] (2009 Aug) conducted a study in 188 patients undergoing orthopaedic procedures.

They divided them into 3 groups. One group served as control receiving only 15 mg hyperbaric bupivacaine. Other groups received 100 microgram and 200 microgram in addition to bupivacaine. They found that dose of 100 and 200 microgram produced good pain relief of around 48 hrs with acceptable side effects.

Sultan Gutierrez MC, Carvalho B [26](2011 october) conducted a study to evaluate incidence of respiratory depression occurring with use of morphine in central neuraxial blockade and concluded that the Pre - Botzinger complex which is located in the medulla oblongata was found to be the region affected by morphine in decreasing the respiratory rate. The optimal single-shot spinal dose was found to be 75µg-150µg and single-shot epidural dose was found to be 2.5mg -3.75 mg.

Popping DM Elia N, Marret E, Wenk M, Tramer MR[21] (2012 Apr) systematically analysed 65 trials published between 1983 and 2010. Morphine (0.05mg - 2mg) and fentanyl (10µg - 50 µg) added to hyperbaric bupivacaine were the most frequently tested. Duration of postoperative pain relief was prolonged with morphine when compared fentanyl. Morphine increased the risk of nausea,vomiting, urinary retention and pruritus. Fentanyl also increased the risk of pruritus. For fentanyl 10 to 40 µg, the risk of respiratory depression was not significantly increased. Consequently, they concluded that minimal effective doses of intrathecal morphine and fentanyl should be given to prevent unwanted side effects.

AIM OF THE STUDY

To compare the duration of analgesia and the incidence of side effects of three different doses of intrathecal morphine - 50µg, 100µg and 200µg added to 0.5% hyperbaric bupivacaine in patients undergoing subumbilical surgeries.

MATERIALS AND METHODS

This study was conducted at the Chengalpattu medical college hospital, Chengalpattu- between February 2011 to February 2012 on 90 patients of ASA I and II undergoing infraumbilical surgeries. This study was done after ethical committee approval and written informed consent obtained from all patients included in the study.

Study design

The study was done in a prospective double blinded randomised manner.

Selection of cases

Inclusion criteria

Patients in age group of 20 to 50 yrs

ASA I and II

Infraumbilical surgeries

Exclusion criteria

Age <20 yrs and > 50yrs

ASA III and IV

Contraindication to spinal anaesthesia

Patients with decreased cardiorespiratory reserve-COPD, Bronchial asthma

H/o allergy to morphine

STUDY POPULATION

90 patients were included in this double blinded randomised controlled study.

STUDY GROUPS

Patients were divided into 3 groups of thirty patients each.

- Patients in group M1 received 3ml of 0.5% hyperbaric bupivacaine plus 50µg preservative free morphine 0.1ml.
- Patients in group M2 received 3ml of 0.5% hyperbaric bupivacaine plus 100µg preservative free morphine 0.2ml.
- Patients in group M3 received 3ml of 0.5% hyperbaric bupivacaine plus 200µg preservative free morphine 0.3ml.

METHODS:

Patients who satisfy the inclusion criteria are selected and they underwent thorough preoperative evaluation which included the following :

History

History of underlying medical illness, previous surgery, anaesthesia and hospitalisation.

Physical examination

General condition of the patient

Vital signs

Height and weight

Examination of CVS, RS, CNS

Airway and Spine examination

Investigations

Hb %, PCV,BT/ CT, Platelet count, RFT, Blood sugar, ECG, CXR, Blood grouping and cross matching were done. Patient who satisfies the inclusion criteria were explained about the nature of the study and the anaesthetic procedure. Written Informed consent obtained from all the patients taken up for study.

RANDOMISATION

Randomisation of the cases as per the group and the drug preparations were made by the anaesthesiology consultant who did not

participate in the study. I performed the subarachnoid block and made intraoperative and postoperative observations.

PREPARATION

In the Operating room, appropriate equipments for airway management and emergency drugs were kept ready. Then the patients are shifted to the operation theatre. With strict aseptic precautions, intravenous line started with an 18G i.v.cannula and crystalloids started. Pulse Oxymeter, E.C.G. Monitor and Non- Invasive blood Pressure cuff connected to the patient.

Patient turned to right lateral position, under aseptic precautions midline lumbar puncture was performed using 25G Spinal needle in L2-L3/L3-L4 space and after free flow of CSF, drug solution appropriate for the groups given. Then patient turned immediately to supine position. Time of injection of drug into the intrathecal space was considered as 0 min.

BLOCK LEVEL :

SENSORY LEVEL

Assessed by loss of sensation to pin prick using 23 G needle every 15 secs till loss of sensation to pin prick at L2 level. Onset of sensory block was taken as time from intrathecal injection to loss of pin

prick sensation at L2. After 20 mins of performing spinal block, the dermatome level of sensory block noted and was considered as maximum sensory block.

MOTOR BLOCKADE BY MODIFIED BROMAGE SCALE [2]

1. Full movement of legs and feet
2. Just able to flex the knees with free movement of feet
3. Unable to flex knees but with free movement of feet
4. Unable to move legs and feet

All patients received supplemental oxygen by ventimask at 4lts/min. Intraoperative fluids given by appropriate fluid requirement for individual patients.

Intraoperative monitoring of vital signs and side effects

Intraoperative hypotension was treated with crystalloids and Inj.Ephedrine 3 mg when required.Patient's pulse rate, NIBP, respiratory rate, SPO2, ECG, and pain score was monitored throughout the procedure. Intraoperative and postoperatively patients were assessed for sedation, analgesia, side effects using appropriate scores as follows:

Assessment of sedation and pain

Sedation was assessed using 4 point sedation score

0-awake and alert

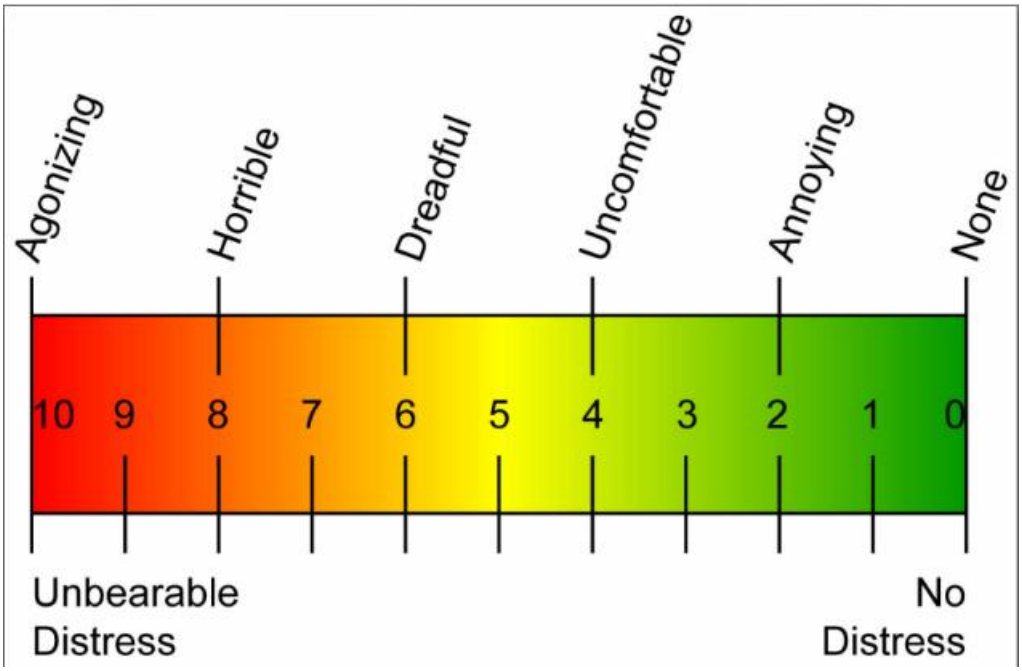
1-minimally sedated/sleepy- appropriate response to conversation

2-moderately sedated-easily arousable

3-deeply sedated-aroused only with significant stimulus

4-could not be aroused

Pain using visual analogue scale



Incidence of side effects

Nausea and vomiting

0-no nausea and vomiting

1-nausea & no vomiting

2-vomiting <3 episodes

3-vomiting >3 episodes

Pruritis

0-no itching

1-slight itching

2-itching that needed pharmacological treatment

Urinary retention

0-no urinary retention

1-required catheterisation

Respiratory depression:

Spo2:

Spo2 < 90% was taken as a criteria for respiratory depression

Respiratory rate

Respiratory rate < 10/min was taken as a criteria for respiratory depression.

Assessment of pain and duration of analgesia

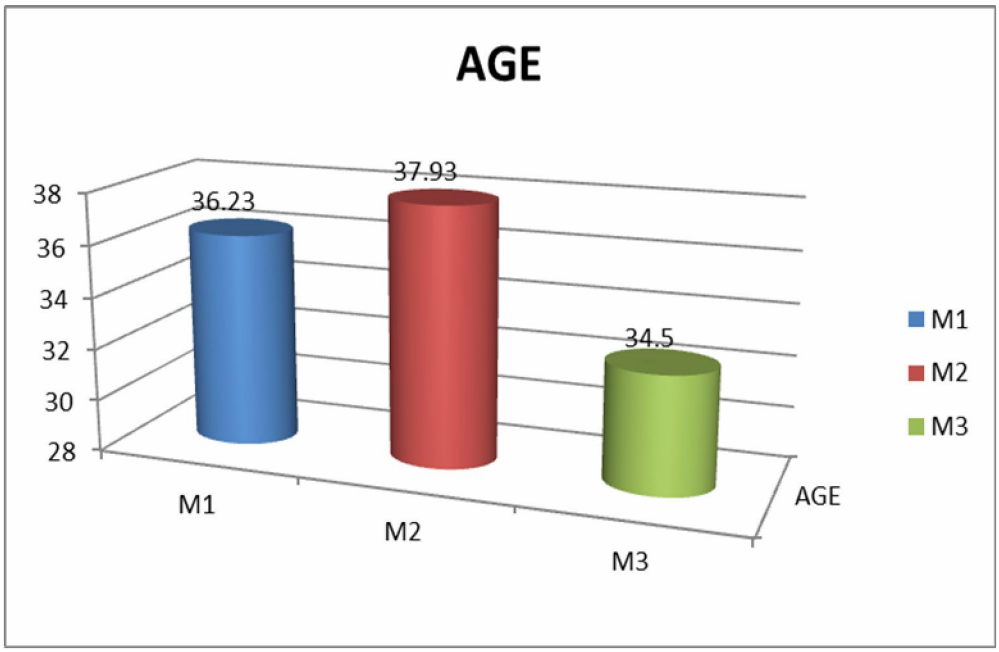
In the PACU, pain assessment using VAS were done using VAS scale till VAS score >2 was reached. If patient complaints of pain, rescue analgesic Inj. Diclofenac 75mg i.m. was given. Duration of effective analgesia was defined as time interval between onset of SAB and time to reach VAS >2.

Vital signs and occurrence of side effects - sedation,, nausea & vomiting, pruritis, urinary retention and respiratory depression were monitored post operatively for 24 hrs.

DISTRIBUTION OF MEAN AGE BY GROUPS

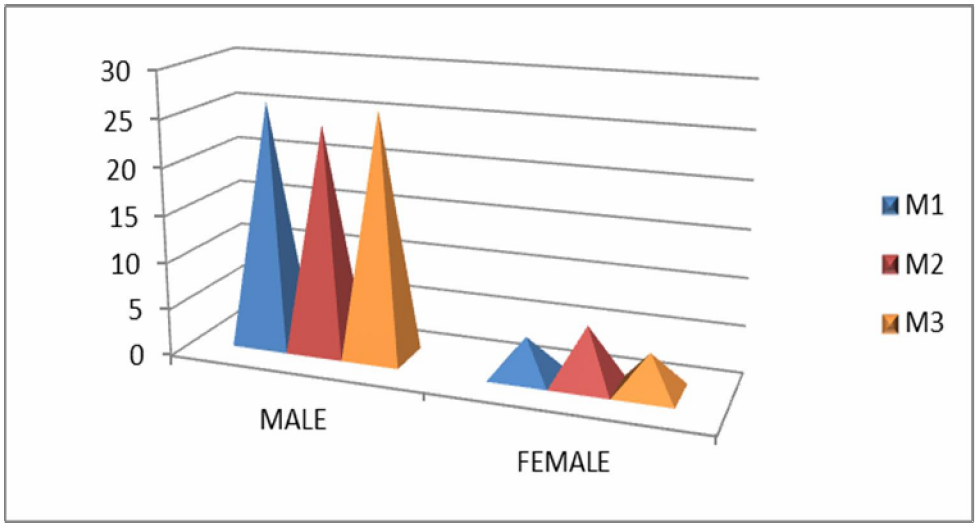
AGE(ONE WAY ANOVA)(years)

GROUP	MEAN± STANDARD DEVIATION	P VALUE
M1	36.23±8.81	0.082
M2	37.93±8.97	
M3	34.5±7.92	



The mean age distribution was 36yrs in group M1, 37yrs in M2, 34yrs in M3. There was no statistical significant difference among the age groups and hence the groups are comparable with respect to age.

SEX



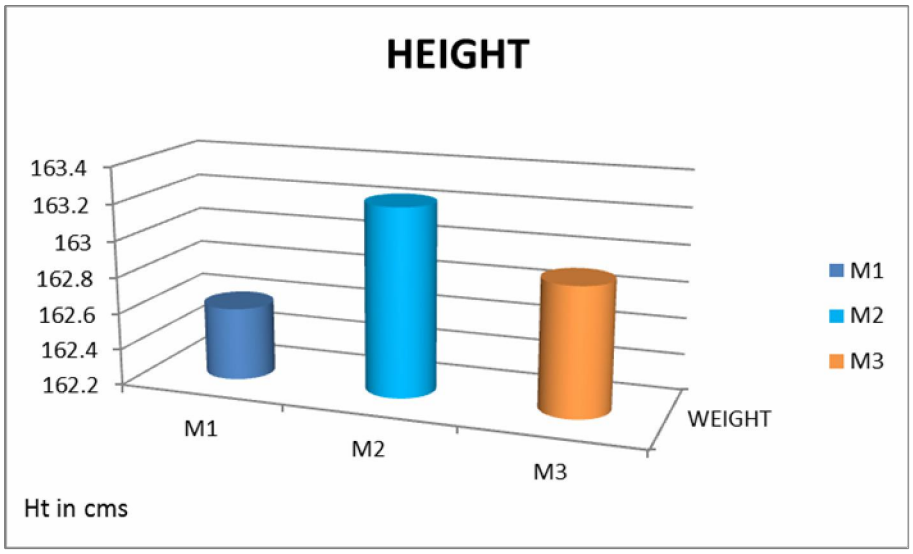
There were more no. of males in the groups than the females. Approximately there were about 5 females in each group and hence the groups were comparable with respect to sex distribution.

TYPE OF SURGERY BY GROUPS

Surgery	Group M1	Group M2	Group M3
Inguinal hernia repair	10	10	11
Varicose vein stripping & ligation	2	2	1
Incisional hernia repair	2	3	2
Interval Appendicectomy	3	2	2
Grade III Haemorroids	1	1	2
# Both bones leg	9	10	9
# Shaft of femur	3	2	3

HEIGHT(ONE WAY ANOVA)(cm)

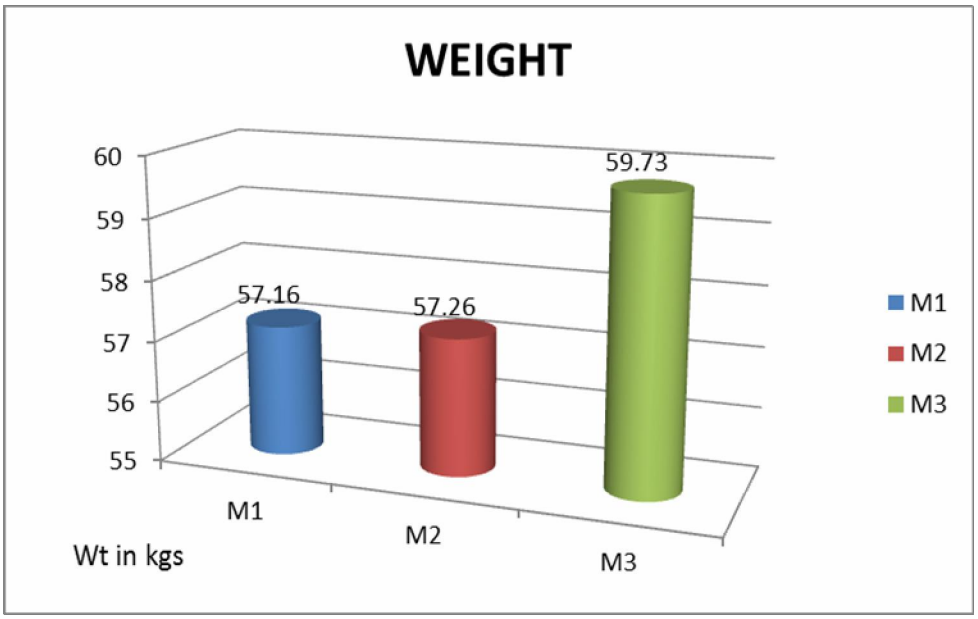
GROUP	MEAN± STANDARD DEVIATION	P VALUE
M1	162.56±3.79	0.789
M2	163.23±3.55	
M3	162.9±73.94	



The mean height among the patients were 162cm in group M1, 163cm in group M2, 162cm in group M3 and there was no statistical difference among them. Thus the groups were comparable with repect to their height.

WEIGHT (IN KG)

GROUP	MEAN± STANDARD DEVIATION	P VALUE
M1	57.16±5.71	0.144
M2	57.26±7.07	
M3	59.73±3.685	



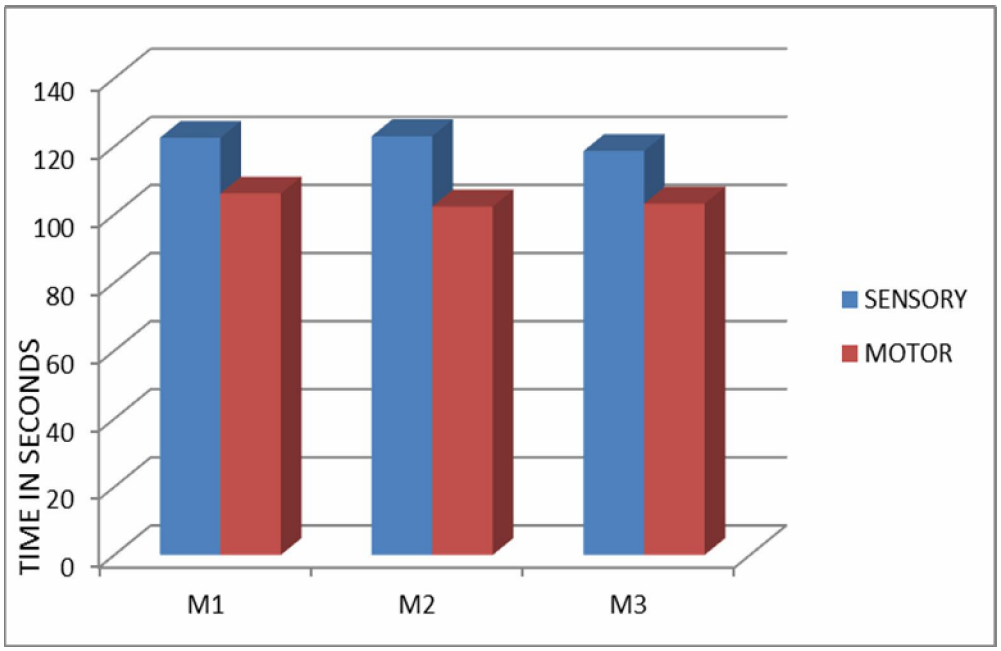
The mean weight distribution was 57kg in M1, 57kg in M2, 59kg in M3 and there was no difference among them and thus the groups were comparable with respect to their weight

ONSET OF SENSORY BLOCK (ONE WAY ANOVA)(SECS)

GROUP	MEAN ± STANDARD DEVIATION	P VALUE
M1	122.5±11.35	0.191
M2	123±9.248	
M3	118.6±9.27	

ONSET OF MOTOR BLOCK (ONE WAY ANOVA)(SECS)

GROUP	MEAN± STANDARD DEVIATION	P VALUE
M1	106.16±8.47	0.156
M2	102.33±7.958	
M3	103.16±7.598	



ONSET OF SENSORY AND MOTOR BLOCK

The mean time for onset of sensory block was 122secs for M1,123secs for M2,118secs for M3 and the groups did not differ statistically with respect to onset of sensory block..

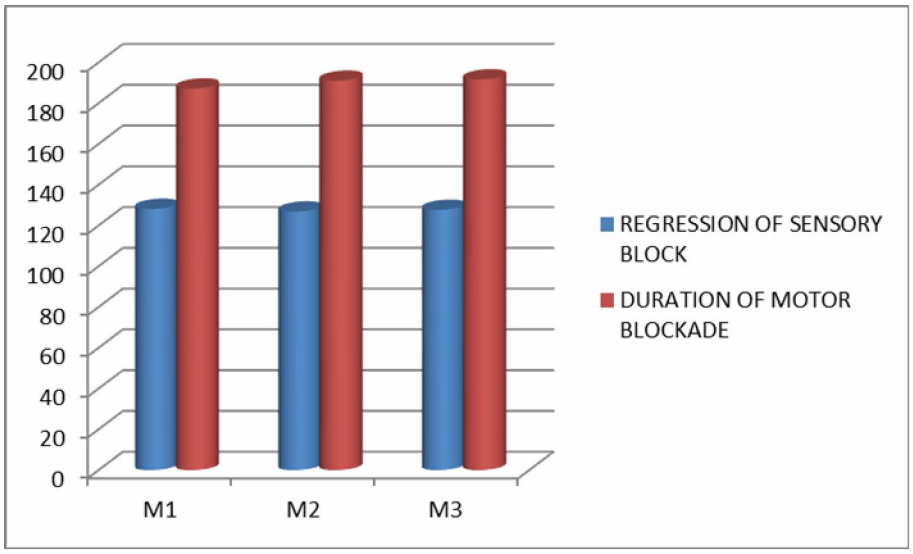
The mean time for the onset of motor block was 106seca for M1, 102 for M2, 103secs for M3 and the groups did not differ statistically with respect to onset of motor blockade.

TWO SEGMENT REGRESSION(ONE WAY ANOVA)(MINS)

GROUP	MEAN ± STANDARD DEVIATION	P VALUE
M1	128.166±6.88	0.851
M2	126.83±9.60	
M3	127.66±10.64	

DURATION OF MOTOR BLOCK(MINS)

GROUP	MEAN ± STANDARD DEVIATION	P VALUE
M1	187.17±8.06047	0.209
M2	191.17±8.12	
M3	191.66±9.94	



TWO SEGMENT REGRESSION

The time for two segment regression was 128 mins for group M1, 126 mins for M2, 127 mins for M3 and the groups did not differ statistically with respect to two segmental regression of sensory block.

DURATION OF MOTOR BLOCK

The time of duration of motor block was 187 mins in Group M1, 191 mins in M2, 191 mins in M3 and the groups did not differ statistically with respect to the duration of motor blockade.

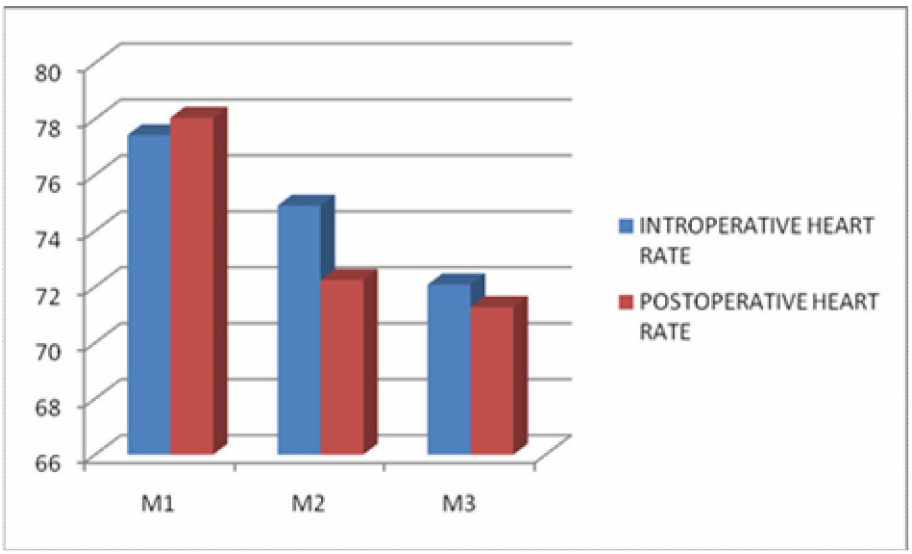
HEART RATE(Beats/min)

INTRAOPERATIVE

Group	MEAN ± STANDARD DEVIATION	P value
M1	76.418±4.54	0.001
M2	74.9±4.479	
M3	72.08±6.453	

POSTOPERATIVE

Group	MEAN± STANDARD DEVIATION	P value
M1	78.04±4.66	0.000
M2	72.24±2.33	
M3	71.27±1.623	



INTRAOPERATIVE AND POSTOPERATIVE HEART RATE

The mean intraoperative heart rate was 76 /min in group M1, 74/min in M2, 71 / min in M3 and there was difference between the groups statistically.

The mean postoperative heart rate was 78 /min in group M1, 72/min in M2, 71 / min in M3 and there was difference between the groups statistically.

Thus there is a significant difference between the groups with respect to the intraoperative and postoperative heart rate.

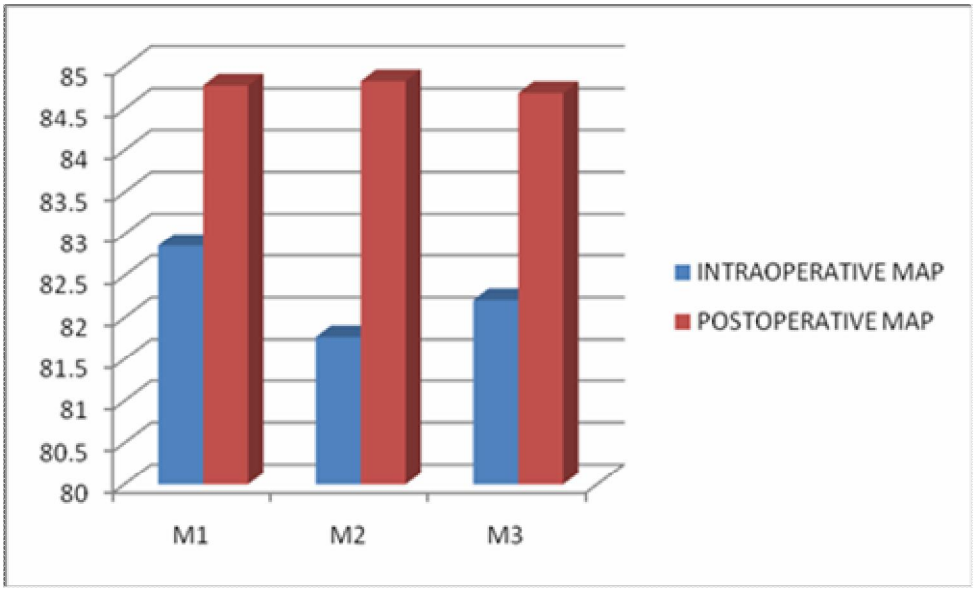
MEAN ARTERIAL PRESSURE(mmHg)

INTRAOPERATIVE

Group	MEAN± STANDARD DEVIATION	P value
M1	84.78±1.921	0.959
M2	84.83±1.997	
M3	84.69±1.763	

POSTOPERATIVE

Group	MEAN± STANDARD DEVIATION	P value
M1	82.86±3.299	0.526
M2	81.77±4.269	
M3	82.21±3.556	



MEAN ARTERIAL PRESSURE

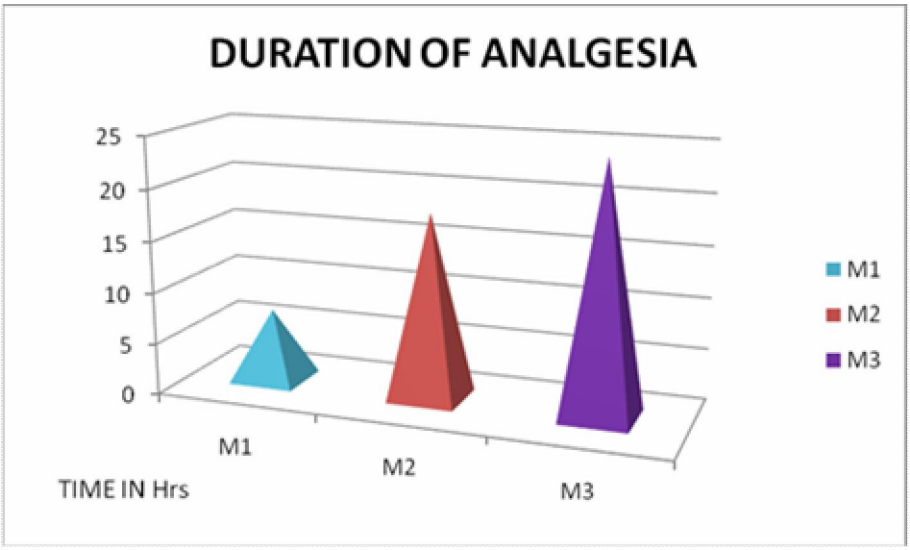
The intraoperative mean arterial blood pressure was around 84mmHg in all the three groups and they were statistically insignificant.

The postoperative mean arterial blood pressure was 82 mmHg in group M1, 81mmHg in M2, 82 mmHg in M3 and they were statistically insignificant.

Thus the three groups did not differ statistically with respect to mean arterial blood pressure.

DURATION OF ANALGESIA (ONE WAY ANOVA)(Hours)

GROUP	MEAN ± STANDARD DEVIATION	P VALUE
M1	7.033±1.6709	0.000
M2	18.03±5.869	
M3	24.26±7.88	



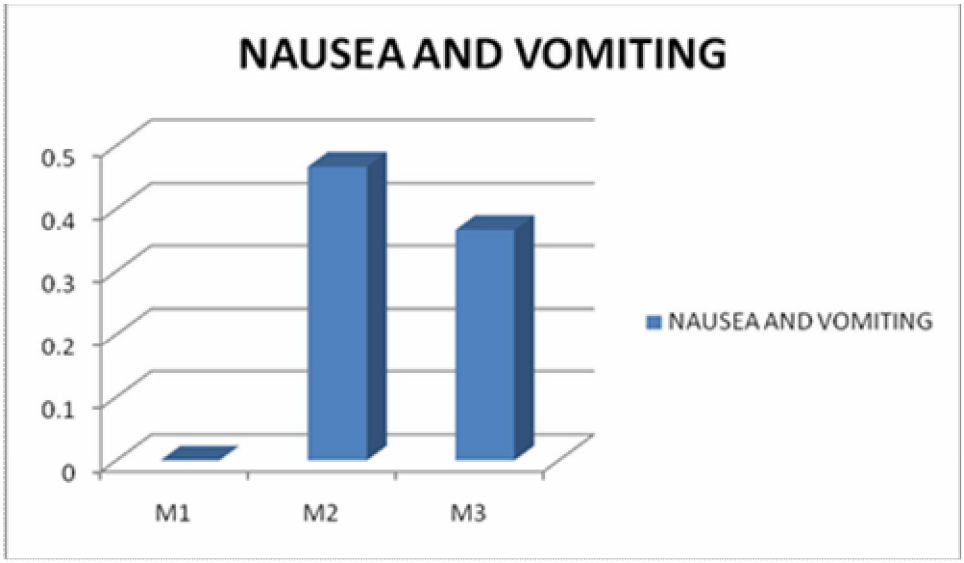
MEAN DURATION OF ANALGESIA

The mean duration of analgesia was 7 hours in group M1, 18 hours in group M2, 24 hours in group M3 and they were statistically significant. Thus there is statistically significant difference between the duration of analgesia between the groups showing that group M3 has the longest duration of analgesia.

INCIDENCE OF SIDE EFFECTS

NAUSEA AND VOMITING

Group	MEAN ± STANDARD DEVIATION	P value
M1	0	0.013
M2	0.467±0.8193	
M3	0.367±0.7183	

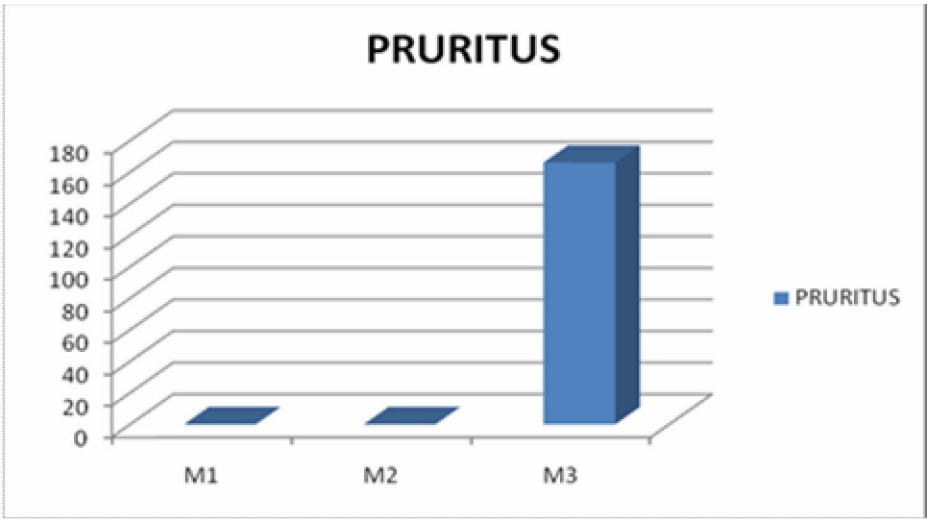


NAUSEA AND VOMITING

There was no incidence of nausea and vomiting in group M1, but 8 patients in the group M2 and 7 patients in group M3 had incidence of nausea and vomiting. Thus showing that the three groups did not differ with respect to the incidence of nausea and vomiting.

PRURITIS

GROUP	MEAN± STANDARD DEVIATION	P VALUE
M1	0	0.004
M2	0	
M3	0.166 ±0.379	

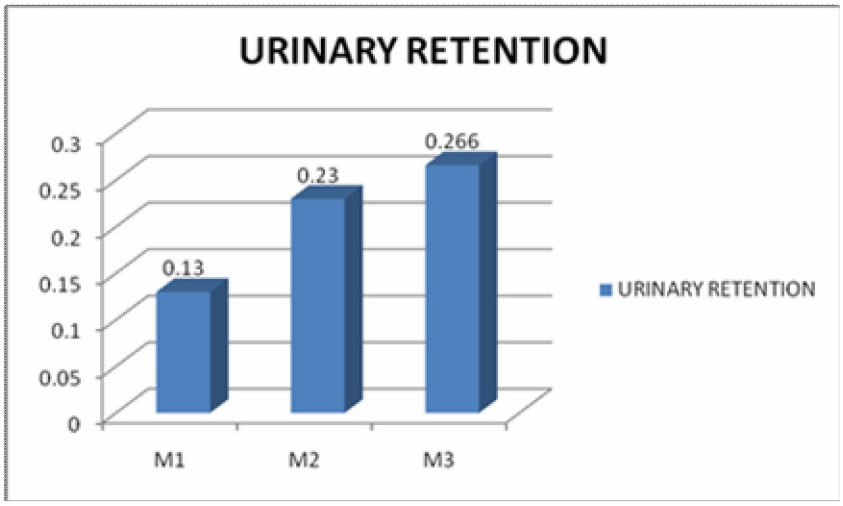


PRURITIS

There was no occurrence of pruritis in group M1 and M2, 5 patients had pruritis in group M3.Thus there was statistically significant difference between the three groups showing that group M3 had the incidence of pruritis.

URINARY RETENTION

GROUP	MEAN± STANDARD DEVIATION	P VALUE
M1	0.133±0.3457	0.416
M2	0.233±0.3457	
M3	0.266 ±0.4976	



URINARY RETENTION

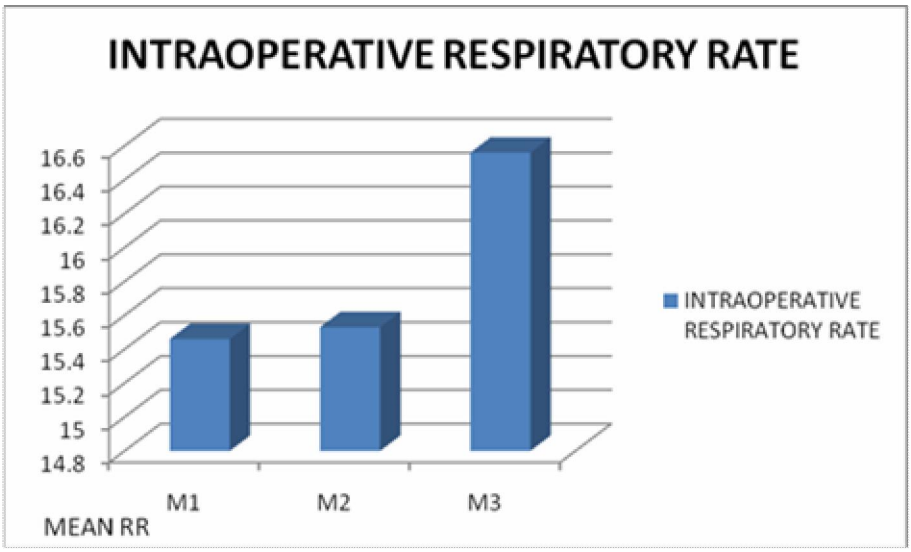
The incidence of urinary retention was 4 patients in group M1, 7 patients in group M2, 8 patients in M3 but they were statistically insignificant.

There was no significant difference in the incidence of urinary retention between the three groups.

RESPIRATORY DEPRESSION

INTRAOPERATIVE RESPIRATORY RATE(Breaths / min)

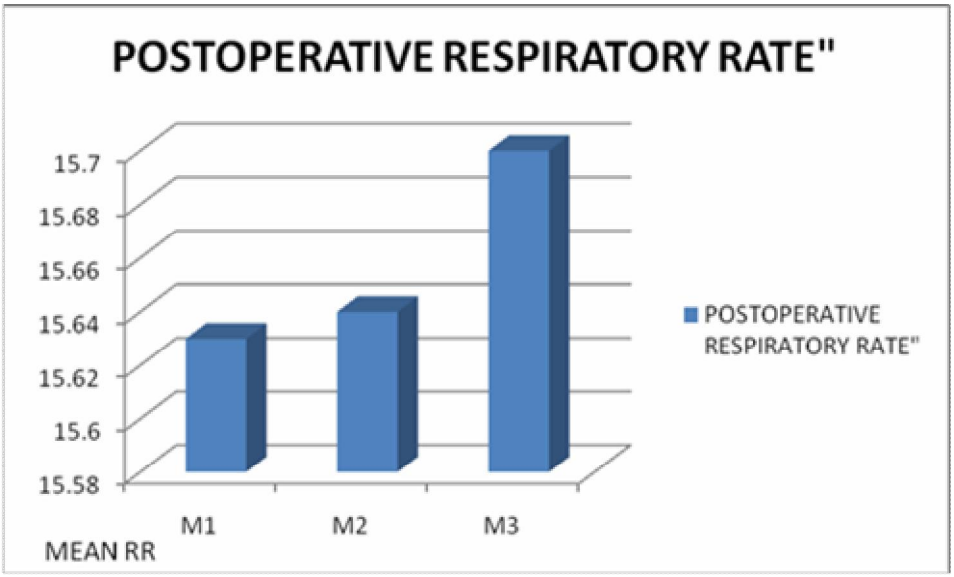
GROUP	MEAN ± STANDARD DEVIATION	P VALUE
M1	15.46±0.28	0.000
M2	15.53±0.28	
M3	16.56±0.158	



The mean intraoperative respiratory rate was 15 / min in group M1, 15/min in M2, 16/min in M3. There was statistical difference but was not of any clinical significance.

POSTOPERATIVE RESPIRATORY RATE(Breaths / min)

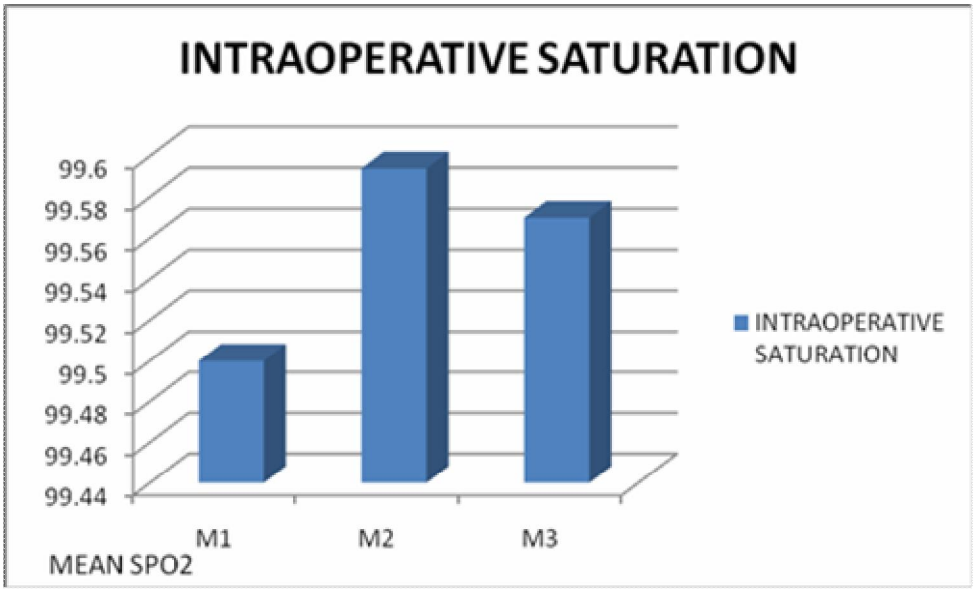
GROUP	MEAN ± STANDARD DEVIATION	P VALUE
M1	15.63±0.1354	0.000
M2	15.64 ±0.124	
M3	15.7±0.09	



The mean postoperative respiratory rate was 15 breaths / min in all the three groups. There was a statistical difference but was not of any clinical significance.

INTRAOPERATIVE SATURATION(%)

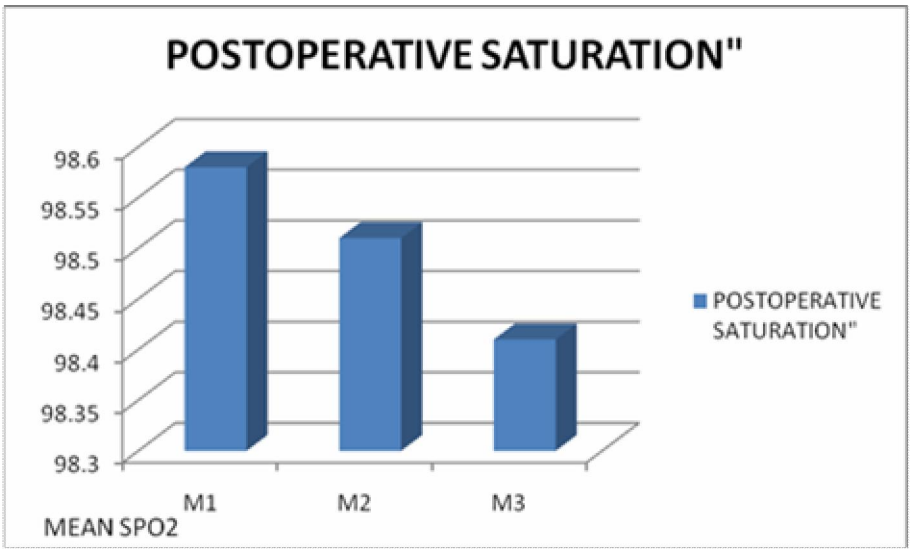
GROUP	MEAN ± STANDARD DEVIATION	P VALUE
M1	99.5±0.274	0.186
M2	99.594±0.139	
M3	99.57±0.176	



The mean intraoperative saturation was around 99% in all the groups and there was no statistical difference between them.

POSTOPERATIVE SATURATION(%)

GROUP	MEAN ± STANDARD DEVIATION	P VALUE
M1	98.58±0.32	0.025
M2	98.5±0.19	
M3	98.41±0.179	



The mean postoperative saturation was around 98% in all the three groups. There was a statistical difference between them but was of no clinical significance.

DISCUSSION

Providing a pain free postoperative period is an essential part of postoperative care. Commlonly intravenous narcotics or NSAIDS are given. But they provide short lasting analgesia needing frequent doses and are associated with more side effects due to cumulative doses. This could be overcome by giving intrathecal or epidural analgesics with less side effects.

Since the description of administration of intrathecal morphine by wang et al in 1979 [29], there have been several applications of this technique for both chronic and acute pain. This technique has been used in abdominal, orthopedic, or open heart surgical procedures. Opioids given through central neuraxial blockade either by continuous or a single shot technique have shown to provide long lasting pain relief.

Preservative free Morphine Sulphate added to hyperbaric bupivacaine for spinal anaesthesia have been shown to provide excellent and long lasting post - operative analgesia as long as for around 30 hours which is very advantageous in early ambulation and recovery and a pain free postoperative period.It is a single shot technique avoiding frequent administration of drugs and so the lesser incidence of side effects.

AGE / HEIGHT / WEIGHT

The three groups were comparable with respect to age, height and weight.

ONSET OF SENSORY BLOCK

The mean time for onset of sensory block was 122secs for M1, 123secs for M2, 118secs for M3.The groups did not differ statistically with respect to onset of sensory block.

This correlated with the study done by **Ezzat Abouleish *et al*[6]** who concluded that 200µg morphine with hyperbaric spinal bupivacaine for cesarean section did not have any difference in onset of sensory and motor block.

ONSET OF MOTOR BLOCK

The mean time for the onset of motor block was 106 secs for group M1, 102secs for M2, 103secs for M3 and The groups did not differ statistically with respect to onset of motor blockade.

This correlated with the study done by **ABBOUD TK *et al*** [1]who concluded that 100µg and 200µg morphine with hyperbaric spinal bupivacaine for cesarean section did not have any difference in onset of sensory and motor block.

TIME FOR TWO SEGMENTAL REGRESSION

The time for two segment regression was 128 mins for group M1, 126 mins for group M2, 127 mins for group M3 and the groups did not differ with respect to two segmental regression of sensory block..

This correlated with the study done by **Ezzat Abouleish *et al*[6]** who concluded that 200µg morphine with hyperbaric spinal bupivacaine for caesarean section did not have any difference in two segment regression of sensory blockade.

MEAN DURATION OF MOTOR BLOCK

The time of duration of motor block was 187mins in Group M1, 191 mins in group M2, 191 mins in group M3 and the groups did not differ with respect to the duration of motor block.

Demiraran Y et al[5] concluded that there was no difference in the motor blockade between the intrathecal morphine with hyperbaric bupivacaine group when compared to only hyperbaric bupivacaine group.

HAEMODYNAMIC PARAMETERS

Heart rate

In our study we observed that there was significant difference in the heart rate in the intraoperative and the postoperative period between

the three groups. Mean heart rate in the intraoperative period was 72 in group M3 when compared to around 74 in group M2 and 76 in group M1. In the postoperative period, the mean heart rate had much statistical difference of 71 in group M3 when compared to 72 in group M2 and 78 in group M1 reflecting that there was much analgesia in groups M2 and M3 when comparing to group M1 and thus a decreased stress response and thus a decrease in catecholamine release thus a better hemodynamic stability.

This was correlating with the study done by **Karaman S, et al** [14] who concluded that postoperative HR values at 4 hr, 8 hr, 12 hr, and 20 hr were significantly lesser in the morphine group thus showing that postoperative VAS scores stress response were lower thus decreasing the heart rate.

MEAN ARTERIAL BLOOD PRESSURE

There was not a much of increase in blood pressure in the postoperative period due to better pain relief in all the three groups. In our study we observed that there was no significant difference in the intraoperative and post- operative mean arterial blood pressure among the three groups.

This correlated with study done by **Kong SK et al [16]** (2002 Dec) who concluded that systemic analgesic requirement was lower in morphine group, cardiovascular parameters such as the blood pressure remained stable.

MEAN DURATION OF ANALGESIA

In our study, the mean duration of analgesia were-7 hrs for group M1, 18 hrs for group M2, 18 hrs for group M3.The difference is statistically significant among the three groups showing that increasing the dose from 50 µg to 200µg increased the duration of analgesia like the other studies [27].

This correlated with the study done by **Ezzat Abouleish *et al* [6]** who concluded that adding 200µg morphine with hyperbaric spinal bupivacaine for cesarean section is a simple and effective method of providing excellent and prolonged postoperative analgesia.

Gehling MH et al[8] in his study concluded the same result that dose of 100mg and 200 mg added to hyperbaric bupivacaine in patients undergoing orthopaedic surgeries increased the duration of analgesia without any need for systemic opioids.

Demiraran Y et al[5] also concluded in his study that adding 0.16 mg morphine to spinal anesthesia with hyperbaric bupivacaine provides excellent postoperative pain relief when compared to only bupivacaine decreasing the pain scores and analgesic requirements.

INCIDENCE OF SIDE EFFECTS

Commonly occuring side effects with opioid administration include sedation,nausea and vomiting, pruritis, urinary retention, respiratory depression.

SEDATION

None of the patients developed sedation in all the three groups. Thus there was no incidence of sedation in 50µg, 100µg and 200µg intrathecal morphine.

NAUSEA AND VOMITING

In our study we observed that nausea and vomiting occurred in group M2 and M3 and not in M1. Thus dose of 50µg intrathecal morphine didn't produce any nausea and vomiting but100µg and 200µg dose s produced nausea and vomiting. The incidence and severity of nausea and vomiting were increased in females when compared to the male patients.

The incidence of nausea and vomiting in groups M2 and M3 were more or less similar and there was no increased incidence of nausea and vomiting in group M3 when compared to M2.

This correlated with study done by **Gehling M et al**[9] who studied risk and side effects of intrathecal morphine and concluded that spinal morphine was associated with nausea and vomiting but higher doses of morphine was not associated with increased risk ratio for nausea and vomiting.

Girgin NK et al[11] studied the quality of pain relief and severity of side effects of spinal morphine given for caeserean section in a dose range of 0.0 to 0.4 mg and concluded that there was no difference in the incidence of nausea and vomiting among the groups.

PRURITIS

In our study there was incidence of pruritis in group M3 who received 200µg of morphine but in group M1 and M2 pruritis did not occur. 5 patients of group M3 had pruritis but it was self- limiting and did not needed any pharmacological intervention, thus showing increasing the dose of morphine results in increased risk ratio for pruritis. The patients who experienced pruritis did not require any treatment as it was of mild intensity and self limiting.

T.K. Abboud et al[1] concluded in his study that there was pruritis associated with 100 microgram of spinal morphine which did not require any pharmacological intervention.

Gehling M et al[9] performed a study to evaluate the risk and side - effects of intrathecal morphine combined with spinal anaesthesia and concluded that increasing the dose leads to higher incidence of pruritis.

Nakamura T et al[20] concluded in his study that the incidence of pruritus was significantly higher in 100µg and 200 µg groups than in the control group.

Sibilla C et al[24] concluded in his study that there was increased incidence of pruritis in patients receiving spinal morphine and increasing the dose leads to higher incidence of pruritis.

Girgin NK et al[11] in his study concluded that there was increased incidence of pruritis on increasing the dose of intrathecal morphine.

URINARY RETENTION

In our study we found that there was incidence of urinary retention among the three groups.4 patients in group M1, 7 patients in group M2, 8 patients in group M3 had urinary retention that needed catheterisation.

But there was no statistical significance between the three groups with respect to the incidence of urinary retention between the three groups.

Raffaeli W et al[22] concluded in his study comparing 0.015 mg, 0.03 mg, 0.06 mg and 0.25 mg intrathecal morphine and concluded that there was incidence of urinary retention in 20- 40 % of the patients but the groups did not differ with respect to the incidence of urinary retention.

Popping DM, et al[21] concluded in his study that intrathecal Morphine increased the risk of nausea and vomiting, urinary retention, and pruritus but there was no dose responsiveness for these effects.

RESPIRATORY DEPRESSION

Respiratory rate < 10/min and spo2< 90% were taken as criteria for respiratory depression.

In our study mean respiratory rate in the patients of all the three groups were around 15 breaths/ min and though there was statistical difference between the three groups it was not of clinical significance.

The mean spo2 among the three groups were around 98% and though there was statistical difference between the three groups it was not of clinical significance.

Thus none of the patients in the three groups had respiratory depression.

This was correlating with the study done by **Gehling M, Tryba M et al**[9] who concluded that with an intrathecal dose of less than 300µg there was no incidence of respiratory depression.

Gehling M Luesebrink T, Kulka PJ [8]concluded that there was no incidence of respiratory depression among the patients receiving 100µg and 200µg intrathecal morphine.

Sultan P et al[26] in their study concluded that there was no definite definition and criteria for intrathecal opioid induced respiratory depression and bradypnoea seems to be single most predictor foe respiratory depression and the optimal dose of intrathecal morphine would be 75µg -150µg for adequate analgesia without any adverse effects.

Kato R et al [22]concluded in their retrospective study that there was incidence of severe bradypnoea requiring treatment in only 1 patient from a total group of 1915 patients who were given 150µg intrathecal morphine.

Neuraxial opioids exert spinal analgesia by getting access into the spinal cord dorsal horn and modulating A-δ and C fibers to decrease afferent nociceptive input. Morphine is an hydrophilic opioid and hence migrates in the CSF slowly thus prolonged effect of analgesia is observed.

Intrathecal morphine ascends into the area postrema in the medulla, causes nausea and vomiting by stimulation of chemoreceptor trigger zone in the medulla.

The cause of neuraxial opioid–induced pruritus is uncertain, it does not appear to be associated with peripheral histamine release but may be related to central activation of an “itch center” in the medulla or activation of opioid receptors in the trigeminal nucleus or nerve roots with cephalad migration of the opioid.

Recently activation of the central seretonergic receptors is considered to be a main cause for intrathecal morphine induced pruritis**.**

Intrathecal administration of morphine causes urinary retention by suppression of detrusor contractility and decreased sensation of urge.

Incidence of respiratory depression is an important side effect pertaining to the opioid treatment. The cephalad spread of morphine in the subarachnoid space to the cisterns and then to the pons is thought to

be responsible for the diminished respiratory drive [4].Opioids selectively inhibit the neurokinin receptors in the pre- Botzinger complex in the mid brain and this is the reason for the development of decrease in respiratory rate after administration of narcotics. In our study we evaluated the incidence of respiratory depression by monitoring the respiratory rate and spo2.

Thus adding morphine to single shot spinal anaesthesia gives long lasting analgesia than any drug due to its hydrophilicity and the maximum dose taken in our study 200µg did not result in any major adverse effects.

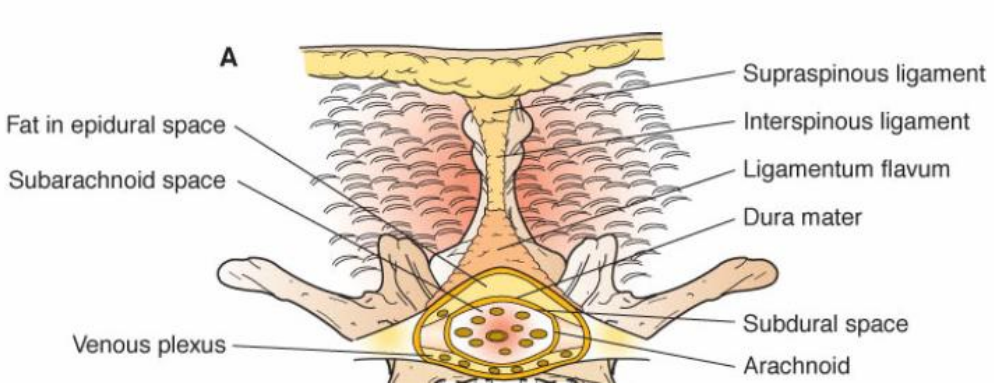
CONCLUSION

I conclude that adding 200 microgram of preservative free morphine sulphate provides long lasting analgesia without much adverse effects compared to 100 microgram and 50 microgram of morphine when added to 0.5% hyperbaric bupivacaine for spinal anaesthesia.

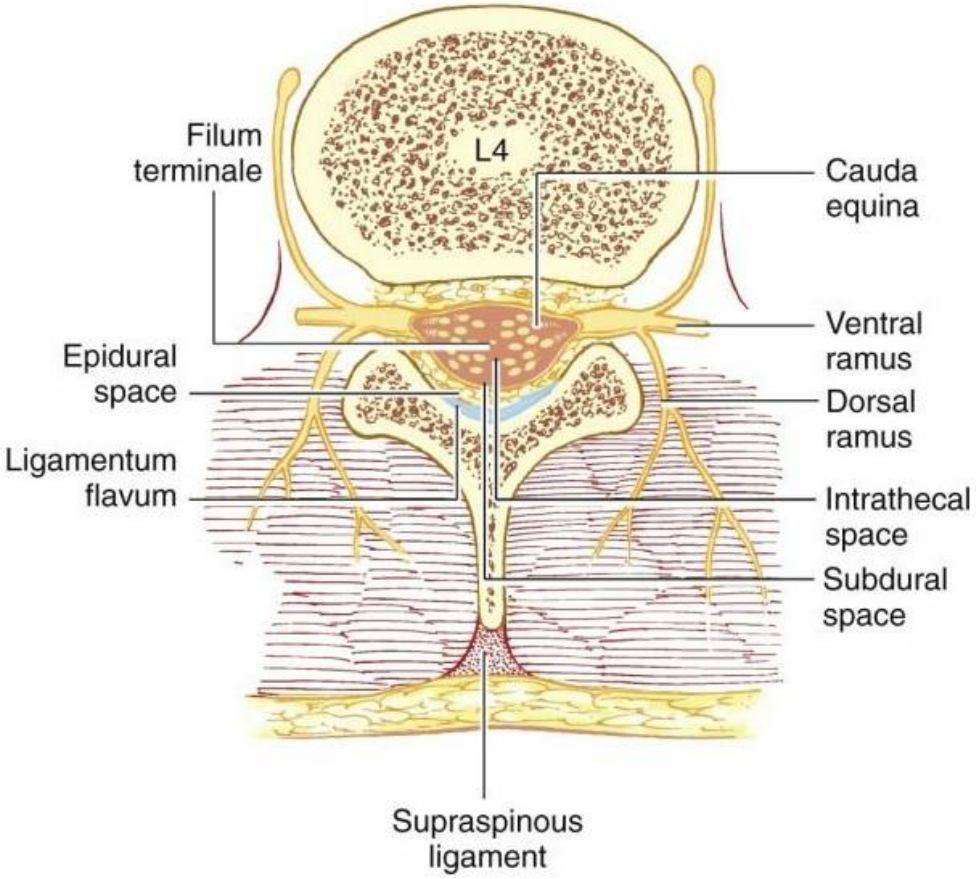
0.5% HYPERBARIC BUPIVACAINE 4ml (5mg/ml)

PRESERVATIVE FREE MORPHINE SULPHATE 1 ml(10mg/ml)

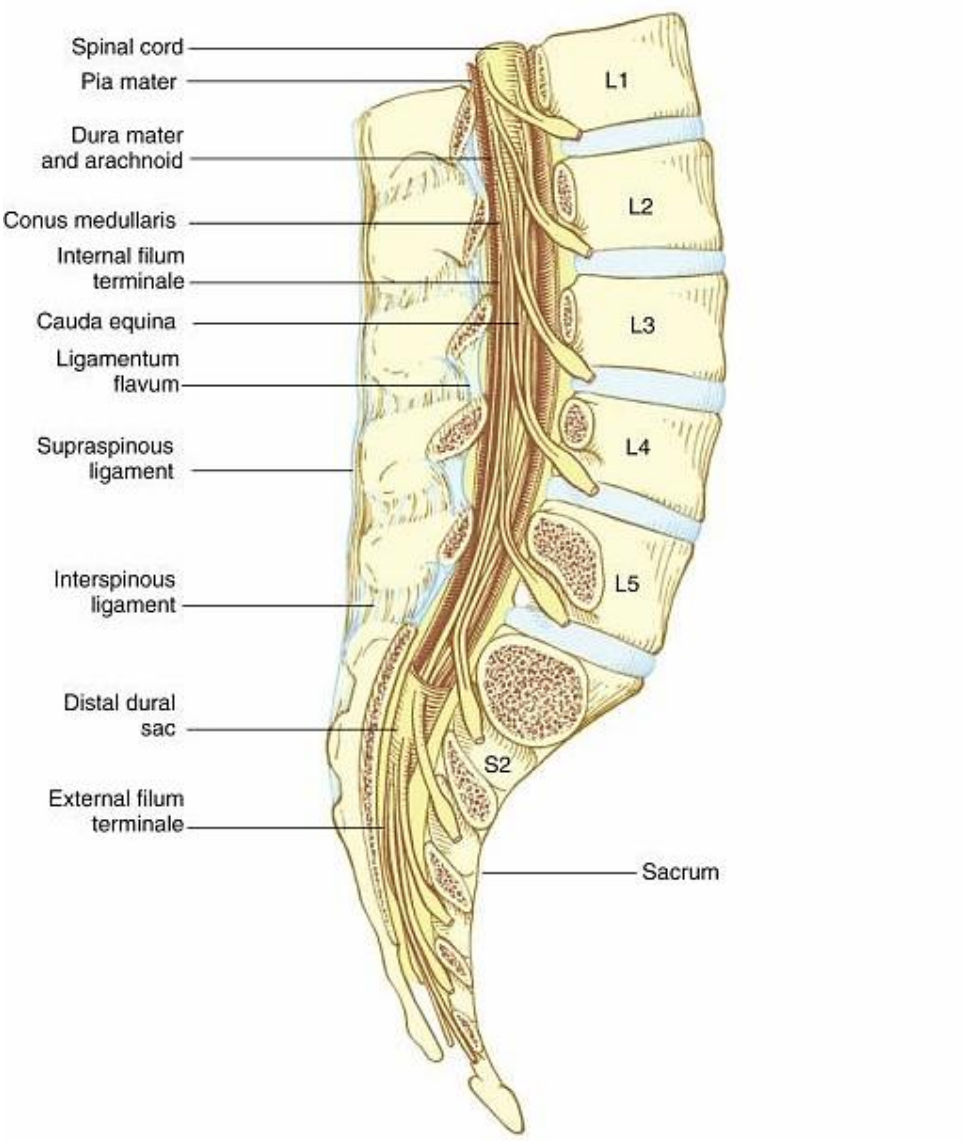
STRUCTURES TO BE PIERCED FOR SUBARACHNOID BLOCK



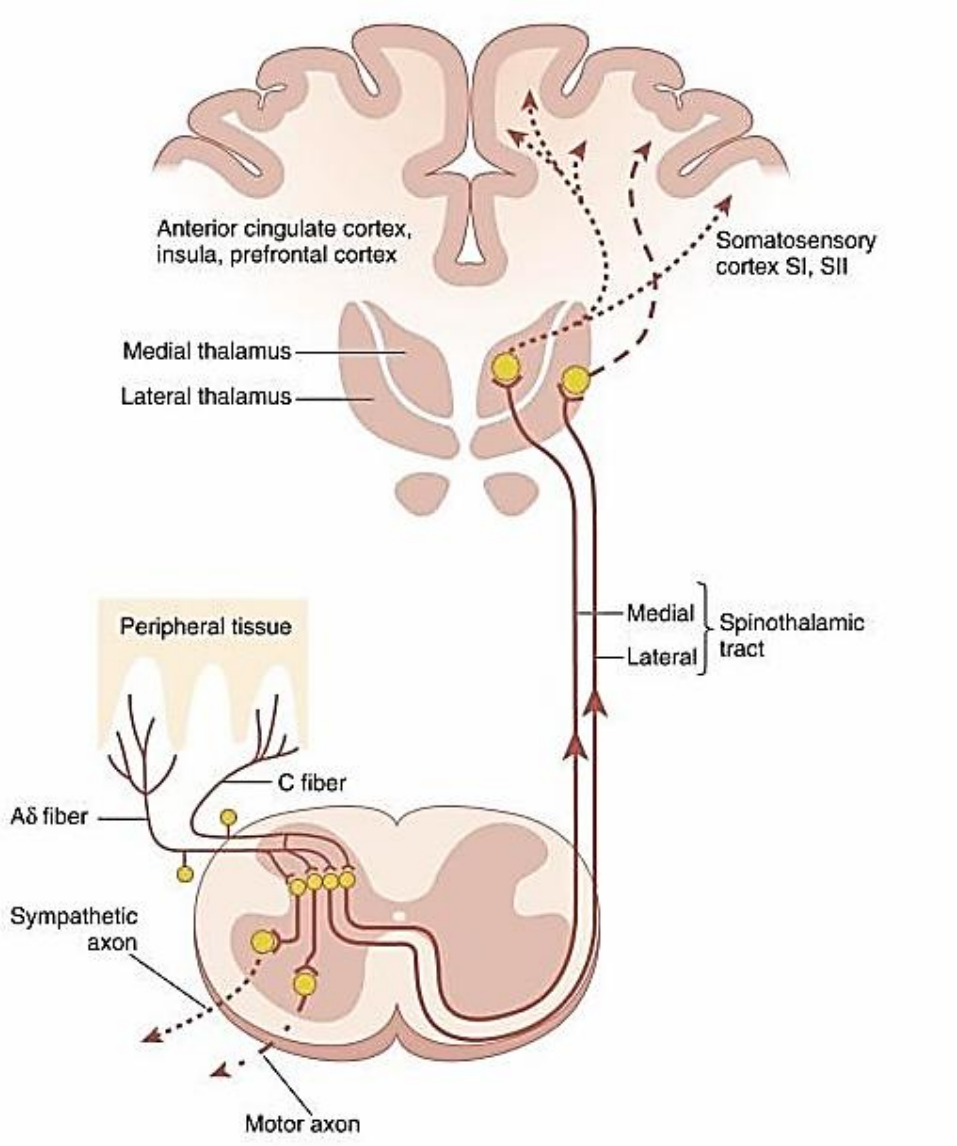
CONTENTS OF DURAL SAC AT LEVEL OF L4



SPINAL CORD – ANATOMY



NOCICEPTIVE PATHWAYS



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PROFORMA

NAME HEIGHT

AGE/SEX WEIGHT

IP NO:

ASA MPC

GROUP

INVESTIGATIONS

Hb	BT	CT	PLATELETS	RBS

UREA	CREATININE	ECG	CXR

IV ACCESS PRELOADING

SAB

POSITION/ APPROACH	SPACE	NEEDLE/SIZE

BLOCK CHARACTERISTICS

BLOCK	SENSORY	MOTOR
ONSET (in sec)		

CHART

TIME / Para meters	0 min	5 mins	10 mins	15 mins	30 mins	1 hr	1.5 hr	2 hr	3 hr	4 hr	5 hr	6 hr	7 hr	8 hr	9 hr	10 hr	11 hr	12 hr	16 hr	20 hr	24 hr
HR																					
SBP																					
DBP																					
MAP																					
VAS																					
SEDATION SCORE																					
NAUSEA &VOMITING																					
PRURITIS																					
URINARY RETENTION																					
RESPIRATORY RATE																					
SPO2																					

GROUP – M1

S.no.	NAME	AGE (Yrs)	SEX	HEIGHT (cm)	WEIGHT (kg)	SEDATION SCORE (grade)	DURATION OF ANALGESIA (hr)	Sensory block		Motor block	
								onset at T10 (sec)	Two segment regression (min)	Onset To grade 1 (sec)	Duration (min)
1	Vijayasarathi	32	M	160	46	0	5	110	135	100	190
2	Govindarajan	26	M	159	55	0	7	120	120	110	200
3	Kotteeswaran	41	M	170	57	0	7	105	125	90	180
4	Jadayan	50	M	163	63	0	6	120	135	110	185
5	Kali	43	M	165	45	0	4	125	140	115	180
6	Nelson	41	M	160	56	0	5	140	120	120	190
7	Deivanai	32	F	165	46	0	6	135	125	110	200
8	Elumalai	27	M	159	55	0	5	110	120	100	180
9	Balu	31	M	167	60	0	5	115	130	110	185
10	Elumalai	40	M	160	57	0	6	110	135	100	180
11	Godhandan	30	M	159	56	0	8	140	120	95	185
12	Kandhan	30	M	160	60	0	5	135	125	120	190
13	Vengatesan	33	M	160	54	0	9	130	120	115	200
14	Pari	40	M	155	65	0	8	140	130	110	190
15	Karunakaran	48	M	166	65	0	8	120	140	110	210
16	Krishnan	40	M	164	50	0	8	125	135	100	180
17	Govindammal	39	F	167	65	0	10	125	130	115	190
18	Murugammal	35	F	166	60	0	8	130	140	90	180
19	Devachidambaram	49	M	164	65	0	7	110	135	95	185
20	Elumalai	41	M	159	55	0	9	130	130	110	180
21	Elangovan	30	M	158	65	0	5	140	120	100	180
22	Baskaran	22	M	160	60	0	8	135	120	115	185
23	Kannagi	20	F	162	50	0	9	120	125	110	190
24	Manokaran	21	M	161	55	0	8	110	130	100	180
25	Ganesan	45	M	170	60	0	9	105	135	105	200
26	Shankar	47	M	168	60	0	6	120	130	110	180
27	Dhanapal	50	M	164	55	0	9	110	120	110	190
28	Rajarathnam	30	M	166	55	0	7	120	125	100	180
29	Sasikumar	44	M	160	60	0	9	130	120	115	190
30	Kandhan	30	M	160	60	0	5	110	130	95	180

GROUP – M2

S.no.	NAME	AGE (Yrs)	SEX	HEIGHT (cm)	WEIGHT (kg)	SEDATION SCORE (grade)	DURATION OF ANALGESIA (hr)	Sensory block		Motor block	
								onset at T10 (sec)	Two segment regression (min)	Onset To grade 1 (sec)	Duration (min)
1	Sathyaraj	24	M	160	56	0	23	110	145	100	190
2	Babu	34	M	159	50	0	23	120	130	110	210
3	Dhinesh	22	M	170	55	0	24	115	125	90	190
4	Panayathammal	45	F	163	45	0	10	125	125	100	185
5	Mannar	38	M	165	60	0	11	125	130	105	210
6	Nagappan	45	M	160	60	0	11	130	120	110	180
7	Rajendran	35	M	165	56	0	11	135	125	100	220
8	Kumar	35	M	165	55	0	10	120	130	100	190
9	Murugan	39	M	160	76	0	23	115	130	100	185
10	Shanthi	40	F	159	45	0	21	110	145	100	190
11	Annamalai	45	M	170	60	0	23	130	120	115	195
12	Kamala	48	F	163	46	0	23	135	135	90	180
13	Ponnammal	50	F	165	55	0	24	120	120	110	200
14	Sivanandaperumal	25	M	160	60	0	12	140	130	110	210
15	Natarajan	41	M	165	55	0	10	120	140	100	200
16	Muthukumar	40	M	160	65	0	10	115	125	100	180
17	Muniyan	35	M	159	63	0	11	125	130	105	190
18	Manikandan	33	M	170	60	0	12	140	130	100	185
19	Murugan	32	M	163	60	0	12	110	125	110	185
20	Dheeran	45	M	165	63	0	13	130	130	90	185
21	Dhanam	50	F	160	60	0	23	120	140	90	180
22	Jeyakanthan	47	M	165	70	0	22	135	120	115	180
23	Kumar	32	M	164	55	0	22	110	115	110	190
24	Deenadhayalan	21	M	160	60	0	23	110	100	95	180
25	Loganathan	21	M	159	45	0	22	115	135	105	210
26	Arumugam	42	M	170	55	0	23	120	120	100	180
27	Rani	50	F	163	56	0	21	130	120	110	180
28	Ramesh	35	M	165	64	0	20	120	125	95	190
29	Soundarrajan	50	M	160	57	0	24	130	110	115	190
30	Sridhar	39	M	165	51	0	24	130	130	90	190

GROUP – M3

S.no.	NAME	AGE (Yrs)	SEX	HEIGHT (cm)	WEIGHT (kg)	SEDATION SCORE (grade)	DURATION OF ANALGESIA (hr)	Sensory block		Motor block	
								onset at T10 (sec)	Two segment regression (min)	Onset To grade 1 (sec)	Duration (min)
1	Balamurugan	42	M	160	56	0	31	100	140	90	190
2	Nagappan	42	M	155	60	0	31	110	130	100	200
3	Logamanigandan	22	M	170	50	0	33	105	115	100	195
4	Kapoorsingh	40	M	164	63	0	15	115	125	110	180
5	Sadhasivam	37	M	160	65	0	15	105	120	100	200
6	Babusugirdaraj	30	M	159	60	0	15	120	100	110	190
7	Aruldoss	20	M	170	55	0	32	115	115	105	220
8	Venkatesan	21	M	163	64	0	30	120	140	100	200
9	Shankar	40	M	165	55	0	30	115	120	100	185
10	Anandan	30	M	160	55	0	33	120	135	100	190
11	Abdul	25	M	165	59	0	32	130	130	115	195
12	Dinakaran	32	M	160	63	0	30	125	145	100	190
13	Veerapathiran	28	M	159	60	0	33	120	130	110	210
14	Janaki	27	F	170	63	0	32	130	130	90	190
15	Sivasankar	28	M	163	64	0	31	120	140	100	200
16	Sudha	22	F	165	55	0	16	105	125	110	190
17	Nayagam	50	M	160	60	0	15	125	140	105	190
18	Pandian	27	M	165	60	0	15	130	140	100	195
19	Jeyakanthan	28	M	159	57	0	16	120	125	110	185
20	Thulasi	35	F	164	63	0	18	130	110	90	195
21	Alaudeen	33	M	160	59	0	16	130	130	100	180
22	Kamalakannan	40	M	168	63	0	30	135	120	115	190
23	Kannan	32	M	160	65	0	15	120	115	110	190
24	Manian	37	M	159	60	0	16	110	130	110	180
25	Marimuthu	38	M	170	60	0	16	105	135	105	210
26	Thanikaivel	20	M	163	64	0	15	120	120	90	180
27	Devadoss	40	M	165	57	0	31	110	120	110	180
28	Kumar	42	M	160	61	0	33	120	135	100	180
29	Kuttiammal	40	F	165	56	0	29	120	140	115	190
30	Rajni	27	M	161	60	0	24	130	130	95	180

SIDE EFFECTS – GROUP M1

S.No.	Name	Group	Nausea & vomiting (Grade)	Pruritis (Grade)	Urinary retention (Grade)
1	Vijayasarathi	M1	0	0	0
2	Govindarajan	M1	0	0	0
3	Kotteeswaran	M1	0	0	0
4	Jadayan	M1	0	0	0
5	Kali	M1	0	0	0
6	Nelson	M1	0	0	0
7	Deivanai	M1	0	0	0
8	Elumalai	M1	0	0	0
9	Balu	M1	0	0	1
10	Elumalai	M1	0	0	0
11	Godhandan	M1	0	0	0
12	Kandhan	M1	0	0	1
13	Vengatesan	M1	0	0	0
14	Pari	M1	0	0	0
15	Karunakaran	M1	0	0	0
16	Krishnan	M1	0	0	0
17	Govindammal	M1	0	0	0
18	Murugammal	M1	0	0	0
19	Devachidambaram	M1	0	0	0
20	Elumalai	M1	0	0	0
21	Elangovan	M1	0	0	0
22	Baskaran	M1	0	0	0
23	Kannagi	M1	0	0	0
24	Manokaran	M1	0	0	1
25	Ganesan	M1	0	0	0
26	Shankar	M1	0	0	0
27	Dhanapal	M1	0	0	1
28	Rajarathnam	M1	0	0	0
29	Sasikumar	M1	0	0	0
30	Kandhan	M1	0	0	0

SIDE EFFECTS – GROUP M2

S.No	Name	Group	Nausea & vomiting (Grade)	Pruritis (Grade)	Urinary retention (Grade)
1	Sathyaraj	M2	0	0	0
2	Babu	M2	0	0	1
3	Dhinesh	M2	0	0	0
4	Panayathammal	M2	2	0	0
5	Mannar	M2	0	0	1
6	Nagappan	M2	0	0	0
7	Rajendran	M2	0	0	0
8	Kumar	M2	1	0	0
9	Murugan	M2	0	0	1
10	Shanthi	M2	2	0	0
11	Annamalai	M2	0	0	0
12	Kamala	M2	2	0	0
13	Ponnammal	M2	2	0	0
14	Sivanandaperumal	M2	0	0	1
15	Natarajan	M2	0	0	0
16	Muthukumar	M2	0	0	0
17	Muniyan	M2	1	0	0
18	Manikandan	M2	0	0	1
19	Murugan	M2	0	0	0
20	Dheeran	M2	0	0	0
21	Dhanam	M2	2	0	0
22	Jeyakanthan	M2	0	0	0
23	Kumar	M2	0	0	0
24	Deenadhayalan	M2	0	0	1
25	Loganathan	M2	0	0	0
26	Arumugam	M2	0	0	0
27	Rani	M2	2	0	0
28	Ramesh	M2	0	0	0
29	Soundarrajan	M2	0	0	0
30	Sridhar	M2	0	0	1

SIDE EFFECTS – GROUP M3

S.No	Name	Group	Nausea & vomiting (Grade)	Pruritis (Grade)	Urinary retention (Grade)
1	Balamurugan	M3	0	0	0
2	Nagappan	M3	0	1	0
3	Logamanigandan	M3	0	0	0
4	Kapoorsingh	M3	1	0	1
5	Sadhasivam	M3	1	0	0
6	Babusugirdaraj	M3	0	0	0
7	Aruldoss	M3	0	0	0
8	Venkatesan	M3	0	0	1
9	Shankar	M3	0	1	0
10	Anandan	M3	0	0	0
11	Abdul	M3	0	0	1
12	Dinakaran	M3	0	0	0
13	Veerapathiran	M3	0	1	0
14	Janaki	M3	2	0	0
15	Sivasankar	M3	0	0	1
16	Sudha	M3	2	0	0
17	Nayagam	M3	0	0	0
18	Pandian	M3	0	0	0
19	Jeyakanthan	M3	0	1	0
20	Thulasi	M3	2	0	0
21	Alaudeen	M3	1	0	1
22	Kamalakannan	M3	0	0	0
23	Kannan	M3	0	0	1
24	Manian	M3	0	0	1
25	Marimuthu	M3	0	0	0
26	Thanikaivel	M3	0	0	0
27	Devadoss	M3	0	1	1
28	Kumar	M3	0	0	0
29	Kuttiammal	M3	2	0	0
30	Rajni	M3	0	0	0

Group M1

S.no	Name	0MIN		5MIN		10MIN		15MIN		20MIN		25MIN		30MIN		45MIN		60MIN		75MIN		90MIN		105MIN		2HR	
		HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP
1	Vijayasarathi	84	97	90	93	85	87	85	91	84	83	83	81	85	87	83	86	78	79	82	91	82	80	75	88	77	86
2	Govindarajan	80	87	87	95	78	77	60	79	60	83	74	90	83	78	86	88	86	87	84	78	77	80	86	83	71	79
3	Kotteeswaran	81	87	88	85	77	75	63	74	60	73	70	88	77	87	85	87	82	93	80	87	80	79	85	93	70	87
4	Jadayan	78	85	85	76	77	85	82	91	63	77	65	80	81	79	76	87	84	87	89	87	76	81	85	87	88	87
5	Kali	84	83	85	91	82	85	74	71	82	86	86	71	60	88	77	71	78	91	84	77	77	87	86	91	87	77
6	Nelson	80	94	90	87	68	79	60	70	74	84	83	77	63	87	80	87	86	71	80	93	80	87	78	87	77	71
7	Deivanai	81	90	87	79	65	85	65	87	70	70	77	70	60	77	76	80	82	79	77	87	77	77	75	78	71	70
8	Elumalai	78	87	88	79	69	90	86	85	65	83	81	69	60	70	77	87	84	81	90	91	82	71	85	87	70	88
9	Balu	77	88	85	93	70	91	83	79	60	67	63	77	83	87	80	80	80	77	70	87	84	70	85	93	88	86
10	Elumalai	90	85	85	95	60	79	77	81	63	87	60	80	77	86	81	88	81	87	72	71	80	88	86	87	87	87
11	Godhandan	89	85	79	79	63	80	81	77	82	72	83	73	81	87	60	87	86	87	60	87	89	87	78	91	87	93
12	Kandhan	91	79	74	81	82	79	60	85	74	79	77	70	60	77	63	85	82	77	54	87	84	87	75	86	93	87
13	Vengatesan	84	74	85	87	74	85	63	87	70	60	81	71	63	71	60	76	84	71	60	77	80	87	86	95	87	91
14	Pari	80	85	95	87	70	85	60	91	65	73	63	87	60	70	86	87	80	70	80	71	76	71	85	78	80	81
15	Karunakaran	81	95	85	91	65	87	60	83	86	77	60	74	60	88	85	87	89	88	80	70	77	77	85	87	70	86
16	Krishnan	78	90	82	83	86	91	63	86	83	77	83	79	63	77	76	87	84	77	70	88	80	71	86	77	72	77
17	Govindammal	77	86	81	90	83	78	82	87	77	76	77	71	82	87	77	72	80	71	80	93	81	70	78	71	60	71
18	Murugammal	90	103	80	87	77	81	74	70	81	85	81	87	74	71	80	93	81	70	84	87	60	88	75	70	54	70
19	Devachidambaram	84	93	76	86	81	79	70	79	63	79	60	77	83	70	86	87	78	88	82	91	77	93	85	88	60	88
20	Elumalai	80	87	85	87	78	79	65	86	60	83	63	72	77	87	82	91	77	76	84	87	80	77	86	87	86	91
21	Elangovan	81	91	86	87	77	87	86	76	63	70	83	80	81	86	84	87	90	71	80	77	76	71	78	87	70	81
22	Baskaran	78	97	90	95	82	95	83	85	82	87	77	75	60	80	86	87	86	87	89	87	77	70	75	93	80	90
23	Kannagi	77	94	87	91	81	77	77	71	74	80	81	87	63	75	82	72	82	87	84	87	80	88	86	87	80	88
24	Manokaran	90	77	88	87	80	71	81	78	70	71	60	73	60	70	84	77	82	77	80	71	81	85	85	91	70	87
25	Ganesan	89	85	85	89	70	85	86	87	65	83	63	78	60	87	80	87	84	71	81	87	60	76	76	87	76	87
26	Shankar	91	87	85	81	60	85	83	78	86	60	60	70	63	86	81	87	80	70	78	87	77	88	77	71	76	87
27	Dhanapal	80	88	79	86	63	85	77	83	83	72	72	72	82	87	78	80	89	88	77	91	80	81	85	77	85	91
28	Rajarathnam	76	95	74	79	82	86	81	77	77	85	63	83	74	71	77	87	84	87	90	77	81	90	86	71	86	78
29	Sasikumar	85	89	85	91	74	72	60	87	86	72	82	75	83	79	90	80	80	87	89	87	60	88	82	70	82	87
30	Kandhan	82	95	95	83	73	79	72	79	83	77	74	78	77	87	89	91	95	88	84	87	77	87	84	88	84	95

GROUP M1

S.no	Name	3HR		4HR		5HR		6HR		7HR		8HR		9HR		10HR		11HR		12HR		16HR		20HR		24HR	
		HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP
1	Vijayasarathi	88	91	86	95	66	87	74	91	70	83	83	81	85	87	83	86	78	86	75	91	82	80	85	88	77	93
2	Govindarajan	85	79	75	78	70	77	70	79	80	83	74	90	83	78	86	95	86	95	84	86	77	80	85	83	85	87
3	Kotteeswaran	86	80	86	87	77	75	65	79	72	73	70	88	77	87	85	80	82	80	84	88	80	79	86	93	86	91
4	Jadayan	78	79	85	85	80	85	86	87	72	77	65	80	81	79	76	87	84	87	80	86	76	81	78	87	78	87
5	Kali	75	87	76	87	66	85	74	95	76	86	86	71	60	88	77	71	80	91	81	77	77	87	75	91	75	93
6	Nelson	86	91	77	91	66	79	70	91	66	91	83	77	63	87	80	95	81	86	78	93	80	87	86	87	86	87
7	Deivanai	85	83	80	78	70	85	65	79	76	79	77	86	60	77	76	80	86	88	77	87	77	77	85	93	85	95
8	Elumalai	76	86	81	87	77	90	86	80	80	80	81	88	60	91	77	87	82	86	90	91	80	71	76	87	85	88
9	Balu	77	83	78	93	80	91	83	79	66	79	63	77	83	83	80	80	84	77	89	87	76	93	85	91	86	86
10	Elumalai	85	86	77	95	66	79	77	85	76	87	60	80	77	86	81	88	80	87	86	71	77	87	86	87	78	87
11	Godhandan	86	87	82	79	70	80	81	77	54	79	83	73	81	87	60	87	81	95	82	87	80	91	78	91	75	93
12	Kandhan	82	79	81	81	76	79	78	85	66	79	77	91	60	77	63	95	74	80	84	86	77	87	75	86	86	87
13	Vengatesan	84	87	80	87	80	85	77	87	76	79	81	83	63	71	60	76	77	71	80	88	80	87	86	95	85	91
14	Pari	80	91	76	95	70	85	60	91	65	87	63	86	60	95	86	87	90	93	81	71	76	71	85	93	76	81
15	Karunakaran	81	83	85	78	65	87	60	83	86	95	60	86	60	88	85	87	89	87	78	95	77	77	85	87	77	86
16	Krishnan	78	86	82	85	86	91	63	86	83	77	83	88	63	77	76	86	84	91	86	88	80	71	86	91	85	77
17	Govindammal	77	91	81	87	83	78	82	87	77	79	77	86	82	87	77	95	80	87	82	93	81	93	78	87	86	71
18	Murugammal	90	83	80	91	77	81	74	79	81	87	81	87	74	71	80	80	81	93	84	87	60	87	75	93	82	95
19	Devachidambaram	89	86	76	78	80	79	70	87	63	79	60	77	83	91	86	87	78	88	80	86	77	91	85	88	84	88
20	Elumalai	91	87	85	87	80	79	65	95	60	83	63	86	77	83	82	91	77	76	81	93	80	87	86	87	86	91
21	Elangovan	86	91	86	87	70	87	86	79	63	79	83	80	81	86	84	86	90	71	78	87	76	71	78	93	78	81
22	Baskaran	92	83	82	95	76	95	83	87	66	87	77	91	60	80	86	88	86	87	77	91	77	70	75	87	75	90
23	Kannagi	85	86	84	91	80	77	77	71	76	80	81	83	63	86	82	86	82	87	84	87	80	88	86	91	86	93
24	Manokaran	86	87	80	85	80	71	81	78	80	71	60	86	60	88	84	77	84	77	80	86	81	85	85	87	85	87
25	Ganesan	82	85	72	87	80	85	78	87	60	83	63	91	60	87	80	91	80	71	81	88	60	76	76	87	76	91
26	Shankar	81	87	68	91	70	85	77	78	68	91	60	86	63	86	81	87	81	70	78	87	77	88	77	71	77	87
27	Dhanapal	80	91	69	78	76	85	83	83	72	83	72	88	82	87	78	80	78	88	77	91	80	81	85	77	85	91
28	Rajarathnam	76	83	70	85	80	86	77	77	72	85	63	83	74	71	77	87	77	87	90	77	81	90	86	71	86	78
29	Sasikumar	85	86	65	91	66	72	81	87	86	86	82	75	83	79	90	80	90	87	89	87	60	88	82	70	82	87
30	Kandhan	82	87	70	83	70	79	78	79	83	77	74	78	77	87	89	91	95	88	84	87	77	87	84	88	84	95

GROUP M2

S.no	Name	0MIN		5MIN		10MIN		15MIN		20MIN		25MIN		30MIN		45MIN		60MIN		75MIN		90MIN		105MIN		2HR	
		HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP
1	Sathyaraj	89	91	78	87	85	72	87	60	75	75	59	70	82	85	74	77	77	95	81	86	59	91	60	88	63	87
2	Babu	91	87	77	95	82	79	83	78	85	87	61	80	83	78	76	85	85	89	70	88	61	83	61	83	68	71
3	Dhinesh	84	71	90	88	78	60	82	85	82	73	63	78	79	72	85	87	83	71	72	87	63	87	62	87	85	95
4	Panayathammal	80	87	84	77	77	73	85	72	78	78	68	87	78	85	82	88	68	87	75	86	68	80	68	76	82	91
5	Mannar	81	91	80	87	66	78	82	77	79	70	79	71	85	75	81	95	70	71	60	87	75	88	75	88	78	71
6	Nagappan	78	97	81	71	82	77	78	78	80	80	65	73	77	78	70	89	56	87	59	71	79	87	79	87	79	77
7	Rajendran	77	93	75	91	78	76	85	70	75	83	59	77	75	77	72	88	75	78	79	79	65	95	65	95	69	77
8	Kumar	90	87	77	87	86	85	82	88	68	75	61	87	59	80	75	76	76	77	65	87	75	76	75	76	65	87
9	Murugan	89	91	76	71	78	78	78	77	69	78	76	86	61	70	60	71	75	80	74	71	88	87	72	87	75	87
10	Shanthi	91	87	89	79	77	70	79	87	66	70	75	85	63	88	63	87	59	91	78	87	78	87	78	85	75	77
11	Annamalai	84	93	91	87	69	78	80	71	76	72	63	80	68	77	86	87	61	87	67	78	61	87	61	87	79	71
12	Kamala	80	88	79	87	68	88	75	71	75	83	68	78	80	87	77	77	63	71	65	77	63	88	63	88	59	93
13	Ponnammal	81	88	89	87	75	77	68	77	60	75	63	85	82	71	74	71	68	91	65	80	68	83	68	83	61	87
14	Sivanandaperumal	78	93	91	91	85	87	76	70	59	78	68	70	78	73	58	70	59	86	59	88	81	87	81	87	63	91
15	Natarajan	77	87	77	87	68	71	75	69	61	80	81	78	79	77	85	88	61	88	79	87	68	86	68	86	68	87
16	Muthukumar	90	103	80	71	70	70	60	78	63	85	83	72	69	70	82	87	63	86	65	95	85	90	85	82	75	91
17	Muniyan	84	93	81	87	80	87	59	79	68	72	77	85	65	72	78	87	68	77	60	76	82	71	75	71	68	86
18	Manikandan	80	87	78	86	63	86	59	60	81	77	74	72	75	83	79	88	81	91	70	87	78	95	78	95	81	86
19	Murugan	81	95	77	88	84	80	61	73	83	78	66	78	70	75	80	71	83	87	68	88	79	89	79	89	83	88
20	Dheeran	78	80	90	71	85	75	63	77	77	85	85	70	78	78	75	87	88	88	90	95	69	87	69	87	60	87
21	Dhanam	77	87	84	95	78	87	68	77	72	71	86	72	67	80	72	86	78	77	85	89	65	86	76	85	70	86
22	Jeyakanthan	89	80	80	88	77	78	81	76	73	77	63	83	60	78	68	95	67	95	82	87	75	83	75	83	68	87
23	Kumar	91	93	78	93	85	72	85	85	79	70	68	75	65	70	81	80	60	80	65	83	75	87	75	87	90	71
24	Deenadhayalan	84	87	78	87	80	80	82	78	65	69	70	78	75	72	83	87	70	87	61	95	79	91	79	91	68	79
25	Loganathan	80	91	77	71	78	60	88	70	75	80	68	73	68	83	88	91	65	91	63	80	65	83	65	83	59	87
26	Arumugam	89	87	90	95	84	72	78	72	88	70	90	77	78	60	68	86	66	86	68	87	65	93	65	93	60	91
27	Rani	91	87	89	88	80	85	79	83	78	87	85	70	67	80	69	88	68	95	66	91	79	83	79	82	70	86
28	Ramesh	84	77	91	93	77	72	80	85	67	86	74	72	60	77	88	86	69	89	85	87	80	91	82	91	68	88
29	Soundarrajan	80	86	85	87	80	77	75	78	60	80	72	83	63	77	77	77	63	88	86	91	75	83	75	83	90	86
30	Sridhar	81	80	84	88	84	70	81	77	79	75	78	75	74	76	82	71	83	76	74	86	70	86	72	85	75	77

GROUP M2

S.no	Name	3HR		4HR		5HR		6HR		7HR		8HR		9HR		10HR		11HR		12HR		16HR		20HR		24HR	
		HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP
1	Sathyaraj	61	91	85	87	72	87	75	93	69	77	77	77	81	88	59	86	60	87	71	87	61	85	61	89	70	87
2	Babu	67	87	82	87	66	77	68	86	65	86	75	91	83	76	61	95	59	87	70	87	72	87	63	81	72	91
3	Dhinesh	65	86	78	77	85	83	69	77	75	77	81	93	77	71	80	80	61	77	78	85	60	88	68	86	75	83
4	Panayathammal	65	77	79	91	86	77	66	81	75	81	70	86	72	87	68	87	63	71	79	83	63	95	85	79	60	90
5	Mannar	59	86	69	71	82	83	76	86	79	86	77	77	61	87	81	91	68	93	69	94	68	89	82	91	63	87
6	Nagappan	79	79	70	77	78	93	75	79	59	79	90	81	79	77	73	86	81	87	65	90	70	95	72	83	68	86
7	Rajendran	65	91	60	91	79	90	60	90	61	81	84	86	65	71	88	88	71	91	75	87	66	85	79	95	90	87
8	Kumar	60	71	59	87	68	83	77	88	63	86	80	77	75	70	78	86	70	87	75	88	75	86	69	91	85	87
9	Murugan	70	77	78	71	90	90	72	76	61	79	78	86	61	88	72	77	70	89	74	85	85	72	65	87	58	95
10	Shanthi	68	83	79	91	85	90	69	71	76	83	78	77	78	87	60	81	59	81	65	85	70	79	75	89	66	90
11	Annamalai	90	71	80	83	74	90	66	87	75	80	70	91	67	87	70	86	86	86	75	79	85	87	62	81	85	86
12	Kamala	85	87	75	83	59	87	76	87	63	87	90	87	60	88	65	79	75	79	72	74	86	91	66	86	86	103
13	Ponnammal	66	87	68	86	79	87	75	77	68	91	86	89	71	86	70	91	65	95	68	85	63	83	68	79	63	93
14	Sivanandaperumal	85	71	69	90	65	86	60	91	63	86	82	81	85	77	68	83	74	95	81	95	73	86	81	93	68	87
15	Natarajan	86	86	78	83	67	90	59	83	68	77	78	86	82	86	69	77	68	88	83	90	70	87	82	87	75	81
16	Muthukumar	63	88	79	77	65	87	61	88	81	71	79	79	78	77	86	81	70	91	88	86	66	85	88	91	72	86
17	Muniyan	68	86	80	87	65	89	63	87	81	91	69	91	70	77	79	86	77	81	78	103	85	76	59	87	68	81
18	Manikandan	70	77	75	87	59	81	68	87	83	83	70	83	75	81	65	79	75	90	78	93	74	91	61	93	81	87
19	Murugan	66	86	68	93	79	86	81	88	88	86	75	86	65	86	75	86	65	87	60	87	63	87	63	87	83	89
20	Dheeran	85	77	69	83	65	79	83	90	78	95	75	77	75	79	88	77	78	71	70	91	68	79	68	95	88	81
21	Dhanam	86	93	66	90	60	91	77	93	67	80	79	86	88	86	82	81	79	77	68	97	70	79	81	88	68	86
22	Jeyakanthan	63	83	76	90	70	83	72	77	60	87	63	77	64	77	61	86	69	71	70	95	77	93	83	87	69	95
23	Kumar	68	87	70	86	68	83	75	83	70	91	65	81	63	81	63	93	65	70	72	93	65	95	70	71	70	87
24	Deenadhayalan	70	83	60	90	90	83	60	83	65	77	79	86	75	86	68	90	75	88	90	87	75	71	60	77	75	91
25	Loganathan	68	90	59	93	85	83	59	93	66	87	80	79	70	77	81	83	88	81	85	91	88	87	59	71	84	79
26	Arumugam	90	90	61	83	82	93	61	77	68	71	75	86	75	81	70	86	78	95	74	87	78	89	61	70	85	91
27	Rani	85	71	63	83	65	86	63	91	65	77	70	77	78	86	85	77	67	91	66	81	63	81	72	88	68	81
28	Ramesh	74	91	68	93	61	90	68	90	67	93	79	81	68	79	82	86	70	83	75	86	75	86	60	81	90	86
29	Soundarrajan	70	83	68	87	63	90	81	90	63	77	65	81	59	81	78	77	75	86	65	87	70	87	63	86	85	87
30	Sridhar	83	83	60	87	70	90	83	93	65	93	83	86	61	86	79	77	65	81	63	89	85	77	68	81	70	85

GROUP M3

S.no	Name	0MIN		5MIN		10MIN		15MIN		20MIN		25MIN		30MIN		45MIN		60MIN		75MIN		90MIN		105MIN		2HR	
		HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP
1	Balamurugan	88	87	82	85	78	89	76	85	76	60	82	73	60	76	72	85	70	87	70	81	63	87	74	87	74	83
2	Nagappan	85	93	83	79	84	76	65	85	54	78	60	72	65	91	66	78	70	71	80	90	68	71	66	77	76	93
3	Logamanigandan	85	87	78	74	80	85	80	79	74	85	64	76	68	87	60	87	65	87	75	88	85	95	76	93	64	87
4	Kapoorsingh	90	95	75	95	81	78	76	85	80	72	77	90	62	79	72	85	60	78	70	80	82	91	60	87	76	91
5	Sadhasivam	87	81	86	85	78	70	54	90	80	77	59	87	66	79	65	71	72	77	82	71	78	71	80	91	70	87
6	Babusugirdaraj	88	86	90	87	77	78	64	91	80	78	66	78	60	93	66	78	68	80	60	77	79	77	74	87	66	78
7	Aruldoss	85	79	86	89	90	88	76	79	70	70	60	70	60	95	60	77	60	91	60	70	69	77	63	71	70	87
8	Venkatesan	85	91	82	81	89	77	74	80	80	88	66	77	70	79	70	80	70	87	80	69	65	87	60	87	80	93
9	Shankar	72	83	84	86	91	87	76	79	70	77	72	87	62	81	60	91	63	71	60	77	75	87	76	87	74	87
10	Anandan	74	95	85	79	84	71	80	85	80	87	66	71	66	87	80	88	70	91	70	80	75	77	70	77	75	91
11	Abdul	85	91	75	95	80	70	76	85	80	71	81	71	70	87	60	77	60	86	75	73	79	71	76	71	64	86
12	Dinakaran	95	87	79	95	81	87	54	87	80	71	66	79	72	91	76	87	64	88	60	70	59	93	60	70	76	95
13	Veerapathiran	75	89	76	83	78	86	74	91	80	77	80	80	60	83	55	71	72	86	54	71	61	87	54	88	70	78
14	Janaki	79	85	77	93	77	80	74	78	70	70	60	79	60	90	59	73	59	77	61	87	63	91	60	93	65	87
15	Sivasankar	76	79	86	91	90	75	80	81	86	69	76	85	66	87	70	77	70	91	64	74	68	87	95	87	60	77
16	Sudha	80	79	68	87	84	87	75	79	80	78	54	72	72	86	60	70	75	87	64	81	75	91	60	91	80	71
17	Nayagam	76	93	83	87	80	78	80	79	70	79	60	83	58	87	60	72	66	88	60	79	68	86	76	87	72	70
18	Pandian	85	91	82	85	81	70	80	87	80	60	74	85	60	87	70	83	72	77	77	79	81	86	63	77	80	88
19	Jeyakanthan	86	91	75	79	78	79	80	95	70	73	72	75	60	95	65	75	77	95	60	78	83	88	60	87	70	87
20	Thulasi	90	87	78	74	77	86	70	77	76	77	70	87	56	91	66	78	74	80	60	79	60	87	74	87	76	87
21	Alaudeen	87	93	69	81	90	76	74	71	70	77	65	73	70	87	70	80	60	87	70	85	70	86	68	71	60	93
22	Kamalakannan	88	87	70	95	89	85	80	85	80	76	76	78	60	89	66	78	63	91	63	90	68	87	70	87	65	87
23	Kannan	85	95	60	91	91	71	80	85	70	85	66	78	74	81	60	70	70	86	76	91	90	71	65	87	77	91
24	Manian	85	88	63	83	80	78	80	85	80	78	60	85	72	86	60	72	54	95	64	79	68	79	60	91	74	87
25	Marimuthu	79	85	82	86	76	87	70	86	74	70	70	71	70	79	70	83	70	89	65	80	59	87	70	77	70	71
26	Thanikaivel	74	79	74	81	85	78	74	72	76	72	73	77	65	91	63	60	69	88	60	79	60	91	72	87	70	77
27	Devadoss	85	90	70	87	85	83	69	79	60	83	60	70	73	83	70	80	60	76	60	85	70	86	66	71	70	71
28	Kumar	95	87	65	81	82	77	66	83	74	85	72	69	75	78	70	77	72	78	71	85	68	88	54	87	82	95
29	Kuttiammal	86	88	75	86	86	87	70	78	70	78	60	83	82	78	60	77	60	81	62	87	90	86	64	86	82	88
30	Rajni	92	85	72	87	78	79	86	78	60	77	60	85	83	85	66	76	60	79	66	91	75	77	75	95	81	87

GROUP M3

S.no	Name	3HR		4HR		5HR		6HR		7HR		8HR		9HR		10HR		11HR		12HR		16HR		20HR		24HR	
		HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP	HR	MAP
1	Balamurugan	60	77	74	77	80	91	80	79	74	89	70	83	80	87	74	77	60	86	80	86	80	87	76	93	70	89
2	Nagappan	70	71	80	86	74	87	67	93	80	81	70	73	72	77	64	93	74	95	68	79	64	89	64	87	80	81
3	Logamanigandan	76	70	70	79	75	87	74	87	76	86	66	77	86	83	80	77	74	80	80	93	70	81	62	91	72	86
4	Kapoorsingh	77	88	80	91	74	95	76	91	72	79	70	86	70	77	66	86	60	87	70	87	64	86	72	87	72	79
5	Sadhasivam	80	87	74	71	54	88	60	87	76	91	74	91	80	83	54	77	72	71	80	91	70	79	70	91	76	91
6	Babusugirdaraj	75	87	66	77	70	86	80	87	75	83	74	79	75	87	60	81	64	95	76	87	80	93	64	78	66	83
7	Aruldoss	80	87	70	83	66	90	70	77	64	95	60	80	80	79	60	86	66	80	66	93	72	87	72	95	76	95
8	Venkatesan	64	71	60	71	60	83	80	75	76	91	84	79	64	83	69	79	60	87	76	87	72	91	77	71	80	91
9	Shankar	60	77	74	87	70	77	76	85	66	87	60	87	76	90	74	81	60	80	70	95	72	87	75	87	66	87
10	Anandan	74	71	76	87	80	85	64	85	74	89	86	79	82	90	60	86	72	88	70	88	72	93	64	89	76	89
11	Abdul	76	70	60	71	74	85	74	79	66	81	74	79	76	90	70	79	74	87	80	87	70	87	70	81	54	81
12	Dinakaran	60	88	59	86	55	86	76	85	60	86	75	79	80	87	80	91	70	95	72	87	64	80	64	86	66	86
13	Veerapathiran	54	87	60	88	80	90	60	90	70	79	76	87	70	87	70	83	70	76	75	81	70	88	72	87	76	79
14	Janaki	63	78	80	86	74	71	68	91	80	93	54	95	75	86	80	87	55	87	66	86	68	87	70	80	65	93
15	Sivasankar	80	77	60	77	76	91	60	79	74	87	60	77	72	90	75	79	74	87	76	79	72	95	76	87	75	87
16	Sudha	74	80	58	86	74	83	80	80	82	91	65	79	80	87	80	86	80	86	60	91	72	76	80	91	83	91
17	Nayagam	76	91	60	77	60	79	80	85	64	87	60	87	65	89	74	77	74	95	54	83	80	87	66	87	77	87
18	Pandian	75	81	80	93	75	93	70	85	76	93	80	79	80	81	74	71	70	80	60	86	72	87	70	87	81	93
19	Jeyakanthan	56	71	64	83	74	87	80	86	77	87	80	83	74	86	80	91	74	87	77	77	72	86	64	71	63	87
20	Thulasi	74	91	61	87	70	85	74	87	82	95	66	79	76	79	76	83	60	91	76	86	70	95	66	77	60	95
21	Alaudeen	55	89	74	83	60	85	60	91	74	88	67	87	70	93	72	86	80	86	76	77	70	71	76	71	63	88
22	Kamalakannan	80	81	76	90	80	86	77	78	74	87	60	80	70	87	76	95	70	88	80	81	72	70	80	93	66	87
23	Kannan	70	86	60	90	70	89	74	81	72	93	80	71	70	91	66	80	70	86	74	86	72	88	60	93	76	88
24	Manian	69	79	62	71	78	81	60	79	75	87	72	83	80	83	64	87	70	77	80	80	70	87	68	87	80	87
25	Marimuthu	80	91	60	91	80	87	74	79	70	87	64	91	74	83	76	91	80	91	76	86	70	87	72	95	60	87
26	Thanikaivel	70	83	80	83	75	93	76	87	70	86	80	83	80	93	80	77	80	87	54	88	70	88	72	88	68	77
27	Devadoss	80	95	74	83	80	87	80	95	66	90	70	85	70	86	66	87	65	80	60	87	65	86	70	92	72	71
28	Kumar	74	91	76	87	74	95	60	77	76	83	82	87	81	90	80	71	80	87	54	86	72	77	72	88	72	93
29	Kuttiammal	60	87	57	93	81	88	74	71	80	77	80	93	72	90	74	77	72	80	60	87	72	86	56	83	86	87
30	Rajni	73	89	67	87	64	87	76	85	74	87	76	87	72	90	60	93	70	87	71	71	70	95	64	87	83	91

GROUP M1

S.no	Name	0MIN		5MIN		10MIN		15MIN		20MIN		25MIN		30MIN		45MIN		60MIN		75MIN		90MIN		105MIN		2HR	
		RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2
1	Vijayasarathi	15	100	15	100	16	99	15	99	16	99	15	99	15	99	16	99	15	99	15	99	15	99	15	100	15	100
2	Govindarajan	15	99	15	99	15	99	18	99	15	99	17	99	16	99	15	100	16	99	16	99	16	99	15	99	15	99
3	Kotteeswaran	15	99	14	100	15	100	16	100	15	100	15	100	15	100	15	100	15	99	16	100	15	99	15	99	14	100
4	Jadayan	18	99	15	99	15	100	15	100	16	100	15	100	15	100	16	100	18	100	15	100	16	100	18	99	15	99
5	Kali	15	100	15	100	16	100	17	100	15	100	15	100	15	100	16	100	15	100	15	100	15	100	15	100	15	100
6	Nelson	15	99	17	100	17	100	15	100	15	100	18	100	19	100	16	100	19	100	16	100	17	100	15	99	17	100
7	Deivanai	16	99	15	100	15	100	16	100	15	100	16	100	18	100	15	99	15	100	15	100	15	100	16	99	15	100
8	Elumalai	17	99	16	100	15	100	15	100	17	100	15	100	15	100	18	99	16	100	15	100	15	99	17	99	16	100
9	Balu	15	100	16	100	15	100	15	100	15	99	19	100	16	100	16	99	16	100	15	100	15	99	15	100	16	100
10	Elumalai	15	99	15	99	16	100	17	99	15	99	15	100	15	100	16	98	15	100	17	99	18	98	15	99	15	99
11	Godhandan	15	99	15	99	15	99	15	99	15	100	16	99	15	100	16	98	17	100	15	99	15	98	15	99	15	99
12	Kandhan	17	100	17	100	17	99	15	100	16	100	16	99	17	100	15	99	15	100	15	99	15	99	17	100	17	100
13	Vengatesan	18	100	15	99	15	99	16	99	15	100	16	99	15	99	17	99	15	100	15	100	15	99	18	100	15	99
14	Pari	15	100	15	99	15	100	15	99	17	100	16	100	15	100	15	99	18	100	15	99	16	100	15	100	15	99
15	Karunakaran	15	100	17	99	17	99	15	99	15	100	16	100	15	100	15	100	15	100	15	99	16	100	15	100	17	99
16	Krishnan	17	99	15	100	15	99	15	99	16	99	16	100	16	100	16	100	15	99	16	99	16	100	17	99	15	100
17	Govindammal	15	100	15	99	18	100	15	100	17	99	16	99	15	100	15	100	16	99	15	100	16	100	15	100	15	99
18	Murugammal	15	99	16	100	15	99	17	100	15	99	15	99	16	99	16	100	16	100	15	99	19	99	15	99	16	100
19	Devachidambaram	15	99	17	100	15	100	15	100	16	100	15	100	15	99	16	100	16	99	14	99	15	99	15	99	17	100
20	Elumalai	15	100	15	99	16	100	15	100	16	100	15	100	16	100	16	100	15	99	15	99	15	99	15	100	15	99
21	Elangovan	16	100	15	100	17	100	15	100	16	100	17	100	16	100	16	100	19	99	15	100	15	98	16	100	15	100
22	Baskaran	15	100	17	99	15	100	16	100	18	100	15	100	16	100	15	100	15	100	18	100	15	98	15	100	17	99
23	Kannagi	15	99	15	99	16	100	15	100	15	100	15	100	16	100	18	99	18	100	15	100	14	99	15	99	15	99
24	Manokaran	18	99	15	99	15	100	15	100	15	100	15	100	15	100	16	99	15	100	15	100	15	100	18	99	15	99
25	Ganesan	15	99	18	100	15	99	15	100	17	100	15	100	16	100	15	98	15	100	17	100	15	100	15	99	18	100
26	Shankar	15	99	15	99	15	99	16	100	15	100	16	100	15	100	16	98	17	100	15	100	15	100	15	99	15	99
27	Dhanapal	15	99	15	99	15	99	15	100	15	100	15	100	17	100	15	99	15	100	15	100	16	99	15	99	15	99
28	Rajarathnam	15	100	18	100	17	100	15	100	16	100	16	100	15	100	16	100	16	100	16	100	15	99	15	100	18	100
29	Sasikumar	15	99	15	100	15	99	16	99	15	100	15	100	15	99	16	100	15	100	16	100	15	99	15	99	15	100
30	Kandhan	15	99	15	99	15	99	15	99	19	99	18	99	15	99	16	99	15	99	16	100	15	99	15	99	15	99

GROUP M1

S.no	Name	3HR		4HR		5HR		6HR		7HR		8HR		9HR		10HR		11HR		12HR		16HR		20HR		24HR	
		RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2
1	Vijayasarathi	15	99	15	99	15	99	15	99	15	99	15	99	17	99	15	99	16	99	16	99	16	99	16	99	16	99
2	Govindarajan	16	99	17	98	15	99	16	99	15	99	17	99	15	99	19	99	15	99	15	99	15	99	16	99	16	99
3	Kotteeswaran	16	98	15	98	17	99	15	98	16	99	15	98	15	98	15	98	15	99	16	97	15	98	15	99	17	99
4	Jadayan	16	98	15	99	15	98	15	98	15	99	16	98	16	98	15	98	16	98	17	98	17	97	15	97	17	97
5	Kali	15	98	18	98	15	98	17	98	15	98	15	98	15	98	16	98	15	98	15	98	15	98	17	98	18	99
6	Nelson	15	98	15	98	17	98	15	98	16	98	15	98	16	98	16	98	18	98	15	98	15	98	15	98	16	99
7	Deivanai	17	99	16	98	15	98	15	98	15	98	18	98	18	98	15	98	15	98	18	98	18	98	15	98	15	99
8	Elumalai	15	99	15	98	15	98	18	98	15	99	15	98	15	98	17	98	17	98	15	98	15	98	17	97	15	98
9	Balu	15	98	16	99	18	98	15	98	16	99	17	99	15	99	15	98	15	98	15	97	15	98	15	98	16	98
10	Elumalai	15	98	15	99	15	99	15	98	15	99	15	99	18	99	15	98	16	98	17	98	16	99	16	98	15	98
11	Godhandan	18	99	15	99	15	99	18	99	15	99	15	99	15	99	15	98	16	98	15	98	15	99	16	99	15	98
12	Kandhan	15	99	18	98	16	99	15	99	17	99	16	98	17	98	16	98	18	98	15	98	16	97	15	99	15	98
13	Vengatesan	15	99	16	99	15	99	15	99	15	98	16	98	15	98	15	98	15	99	16	98	16	99	15	98	16	98
14	Pari	15	99	16	99	15	98	17	99	15	98	15	99	16	99	17	98	17	99	15	99	16	98	16	98	15	98
15	Karunakaran	15	99	17	99	15	99	15	98	18	98	18	99	15	99	16	99	15	99	15	99	15	98	15	99	15	99
16	Krishnan	15	98	15	98	15	98	15	99	15	98	15	98	16	98	16	98	18	99	16	97	18	97	15	97	15	99
17	Govindammal	18	98	15	99	15	98	16	98	15	98	15	99	17	98	15	98	15	99	15	99	15	98	17	99	17	99
18	Murugammal	15	99	16	99	16	98	16	98	19	99	17	99	15	98	17	98	17	99	15	99	15	98	15	99	15	99
19	Devachidambaram	16	98	15	99	15	99	15	99	16	99	15	98	16	99	15	99	15	99	16	99	17	98	15	98	15	99
20	Elumalai	15	99	15	99	15	99	15	98	16	99	16	98	16	99	15	99	16	99	15	99	15	97	17	97	15	99
21	Elangovan	18	99	16	99	18	99	16	99	16	99	15	99	15	99	18	99	17	98	15	97	16	98	15	98	18	98
22	Baskaran	15	98	15	99	15	99	15	99	15	99	15	99	15	99	15	99	15	99	18	98	16	99	18	98	15	98
23	Kannagi	15	98	16	98	15	99	15	99	15	98	17	98	17	99	16	98	16	99	15	98	15	99	15	99	15	98
24	Manokaran	15	99	15	99	19	98	16	98	17	98	15	98	15	98	16	98	15	99	15	98	15	99	18	98	15	98
25	Ganesan	15	98	17	99	15	98	15	99	15	98	15	98	15	98	15	98	16	98	16	98	16	99	15	98	16	98
26	Shankar	17	99	15	98	15	98	15	99	15	98	18	98	16	99	15	98	15	98	15	98	15	98	15	97	15	98
27	Dhanapal	15	99	15	99	17	98	16	99	16	98	15	99	15	99	16	98	17	98	18	97	15	98	16	98	15	99
28	Rajarathnam	16	99	16	99	15	98	15	99	15	98	15	99	16	98	15	98	15	98	15	98	16	97	15	98	15	99
29	Sasikumar	16	99	15	99	16	98	15	98	15	99	17	99	17	98	15	99	15	99	17	98	15	98	15	98	16	99
30	Kandhan	16	99	15	99	15	99	16	99	16	99	15	98	16	98	18	99	16	99	16	99	16	99	16	98	16	98

GROUP M2

S.no	Name	0MIN		5MIN		10MIN		15MIN		20MIN		25MIN		30MIN		45MIN		60MIN		75MIN		90MIN		105MIN		2HR	
		RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2
1	Sathyaraj	15	100	15	100	15	99	15	99	15	99	15	99	15	99	16	99	15	99	15	99	15	99	15	100	15	100
2	Babu	15	99	15	99	15	99	18	99	15	99	17	99	16	99	15	100	16	99	15	99	16	99	15	99	15	99
3	Dhinesh	15	99	14	100	15	100	15	100	15	100	15	100	15	100	15	100	15	99	15	100	15	99	15	99	14	100
4	Panayathammal	18	99	15	99	15	100	15	100	16	100	15	100	15	100	15	100	18	100	15	100	15	100	18	99	15	99
5	Mannar	15	100	15	100	16	100	15	100	15	100	15	100	15	100	15	100	15	100	15	100	15	100	15	100	15	100
6	Nagappan	15	99	16	100	15	100	15	100	15	100	18	100	19	100	15	100	19	100	16	100	17	100	15	99	16	100
7	Rajendran	16	99	15	100	15	100	16	100	15	100	16	100	18	100	15	99	15	100	15	100	15	100	16	99	15	100
8	Kumar	15	99	15	100	15	100	15	100	17	100	15	100	15	100	18	99	16	100	15	100	15	99	15	99	15	100
9	Murugan	15	100	16	100	15	100	15	100	15	99	19	100	15	100	15	99	15	100	15	100	15	99	15	100	16	100
10	Shanthi	18	99	15	99	15	100	17	99	15	99	15	100	15	100	15	99	15	100	17	99	18	99	18	99	15	99
11	Annamalai	18	99	15	99	15	99	15	99	15	100	15	99	15	100	15	99	17	100	15	99	15	99	18	99	15	99
12	Kamala	18	100	18	100	17	99	15	100	16	100	15	99	17	100	15	99	15	100	15	99	15	99	18	100	18	100
13	Ponnammal	18	100	15	99	15	99	16	99	15	100	16	99	15	99	17	99	15	100	15	100	15	99	18	100	15	99
14	Sivanandaperumal	15	100	15	99	15	100	15	99	17	100	15	100	15	100	15	99	18	100	15	99	16	100	15	100	15	99
15	Natarajan	15	100	17	99	15	99	15	99	15	100	15	100	15	100	15	100	15	100	15	99	15	100	15	100	17	99
16	Muthukumar	17	99	15	100	15	99	15	99	16	99	15	100	15	100	16	100	15	99	16	99	15	100	17	99	15	100
17	Muniyan	15	100	15	99	18	100	15	100	15	99	16	99	15	100	15	100	15	99	15	100	15	100	15	100	15	99
18	Manikandan	15	99	16	100	15	99	17	100	15	99	15	99	16	99	15	100	15	100	15	99	19	99	15	99	16	100
19	Murugan	18	99	15	100	15	100	15	100	16	100	15	100	15	99	15	100	16	99	14	99	15	99	18	99	15	100
20	Dheeran	18	100	15	99	16	100	15	100	15	100	15	100	15	100	15	100	15	99	15	99	15	99	18	100	15	99
21	Dhanam	16	100	15	100	15	100	15	100	15	100	17	100	15	100	16	100	19	99	15	100	15	99	16	100	15	100
22	Jeyakanthan	15	100	17	99	15	100	16	100	18	100	15	100	15	100	15	100	15	100	18	100	15	99	15	100	17	99
23	Kumar	15	99	15	99	16	100	15	100	15	100	15	100	15	100	18	99	18	100	15	100	14	99	15	99	15	99
24	Deenadhayalan	18	99	15	99	15	100	15	100	15	100	15	100	15	100	16	99	15	100	15	100	15	100	18	99	15	99
25	Loganathan	15	99	18	100	15	99	15	100	15	100	15	100	16	100	15	99	15	100	17	100	15	100	15	99	18	100
26	Arumugam	15	99	15	99	15	99	16	100	15	100	16	100	15	100	15	99	17	100	15	100	15	100	15	99	15	99
27	Rani	18	99	15	99	15	99	15	100	15	100	15	100	17	100	15	99	15	100	15	100	16	99	18	99	15	99
28	Ramesh	18	100	18	100	17	100	15	100	15	100	15	100	15	100	16	100	16	100	15	100	15	99	18	100	18	100
29	Soundarrajan	18	99	15	100	15	99	16	99	15	100	15	100	15	99	15	100	15	100	15	100	15	99	18	99	15	100
30	Sridhar	15	99	15	99	15	99	15	99	19	99	18	99	15	99	15	99	15	99	15	100	15	99	15	99	15	99

GROUP M2

S.no	Name	3HR		4HR		5HR		6HR		7HR		8HR		9HR		10HR		11HR		12HR		16HR		20HR		24HR	
		RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2
1	Sathyaraj	15	99	15	99	15	99	15	99	15	99	15	99	17	99	15	99	17	99	18	99	16	99	15	99	16	99
2	Babu	15	99	17	99	15	99	16	99	15	99	17	99	15	99	19	99	15	99	15	99	15	99	16	99	15	99
3	Dhinesh	15	98	15	99	17	99	15	98	16	99	15	98	15	98	15	99	15	99	16	97	15	98	15	99	17	99
4	Panayathammal	16	98	15	99	15	98	15	98	15	99	16	98	16	98	15	99	16	98	17	98	17	97	15	97	17	97
5	Mannar	15	98	18	98	15	98	17	98	15	98	15	98	15	98	16	98	15	98	15	98	15	98	17	98	18	99
6	Nagappan	15	98	15	98	17	98	15	98	16	98	15	98	15	98	15	98	18	98	15	98	15	98	15	98	16	99
7	Rajendran	17	99	15	98	15	98	15	98	15	98	18	98	18	98	15	98	15	98	18	98	18	98	15	98	15	99
8	Kumar	15	99	15	98	15	98	18	98	15	99	15	98	15	98	17	98	17	98	15	98	15	99	17	97	15	98
9	Murugan	15	99	16	99	18	98	15	98	16	99	17	99	15	99	15	98	15	98	15	97	15	97	15	98	16	98
10	Shanthi	15	99	15	99	15	99	15	98	15	99	15	99	18	99	15	98	16	98	17	98	16	99	15	98	15	98
11	Annamalai	18	99	15	99	15	99	18	99	15	99	15	99	15	99	15	98	15	98	15	98	15	99	16	99	15	98
12	Kamala	15	99	18	98	16	99	15	99	17	99	16	99	17	99	16	98	18	98	15	98	15	97	15	99	15	98
13	Ponnammal	15	99	15	99	15	99	15	99	15	99	15	99	15	99	15	98	15	99	16	98	16	99	15	99	16	98
14	Sivanandaperumal	15	99	15	99	15	98	17	99	15	99	15	99	16	99	17	98	17	99	15	99	15	99	16	99	15	98
15	Natarajan	15	99	17	99	15	99	15	98	18	98	18	99	15	99	16	99	15	99	15	99	15	98	15	99	15	99
16	Muthukumar	15	98	15	98	15	99	15	99	15	98	15	98	16	98	15	99	18	99	16	97	18	97	15	97	15	99
17	Muniyan	18	98	15	99	15	99	16	99	15	98	15	99	17	98	15	99	15	99	15	99	15	98	17	99	17	99
18	Manikandan	15	99	16	99	16	98	15	99	19	99	17	99	15	98	17	98	17	99	15	99	15	98	15	99	15	99
19	Murugan	15	98	15	99	15	99	15	99	15	99	15	99	15	99	15	99	15	99	16	99	17	98	15	98	15	99
20	Dheeran	15	99	15	99	15	99	15	98	15	99	16	99	16	99	15	99	16	99	15	99	15	97	17	97	15	99
21	Dhanam	18	99	16	99	18	99	16	99	16	99	15	99	15	99	18	99	17	98	15	97	15	98	15	98	18	99
22	Jeyakanthan	15	99	15	99	15	99	15	99	15	99	15	99	15	99	15	99	15	99	18	98	16	99	18	98	15	99
23	Kumar	15	99	16	98	15	99	15	99	15	99	17	98	17	99	15	99	16	99	15	98	15	99	15	99	15	98
24	Deenadhayalan	15	99	15	99	19	99	16	98	17	99	15	98	15	99	16	99	15	99	15	98	15	99	18	99	15	98
25	Loganathan	15	98	17	99	15	99	15	99	15	98	15	98	15	99	15	98	16	98	16	98	16	99	15	99	16	98
26	Arumugam	17	99	15	98	15	98	15	99	15	98	18	98	16	99	15	98	15	98	15	98	15	99	15	97	15	98
27	Rani	15	99	15	99	17	98	16	99	16	98	15	99	15	99	16	98	17	98	18	97	15	98	16	98	15	99
28	Ramesh	15	99	16	99	15	98	15	99	15	98	15	99	15	98	15	98	15	98	15	98	16	97	15	98	15	99
29	Soundarrajan	15	99	15	99	16	98	15	98	15	99	17	99	17	98	15	99	15	99	17	98	15	98	15	98	16	99
30	Sridhar	15	99	15	99	15	99	16	99	16	99	15	98	16	98	18	99	16	99	15	99	15	99	17	98	15	98

GROUP M3

S.no	Name	0MIN		5MIN		10MIN		15MIN		20MIN		25MIN		30MIN		45MIN		60MIN		75MIN		90MIN		105MIN		2HR	
		RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2
1	Balamurugan	15	100	15	100	15	99	16	99	15	99	16	99	16	99	15	99	16	99	15	99	15	99	15	100	15	100
2	Nagappan	15	99	15	99	15	99	15	99	15	99	15	99	15	99	15	99	15	100	16	99	15	99	15	99	15	99
3	Logamanigandan	14	100	15	99	15	100	15	100	15	99	15	100	15	100	15	99	15	100	15	99	15	100	14	100	15	99
4	Kapoorsingh	15	99	18	99	16	100	15	100	15	99	16	100	16	100	15	99	15	100	18	100	15	100	15	99	18	99
5	Sadhasivam	15	100	15	100	15	100	16	100	15	99	15	100	15	100	15	99	15	100	15	100	15	100	15	100	15	100
6	Babusugirdaraj	16	100	15	99	15	100	17	100	15	99	15	100	15	100	15	99	15	100	19	100	16	100	16	100	15	99
7	Aruldoss	15	100	16	99	15	100	15	100	15	99	15	100	15	100	15	99	15	99	15	100	15	100	15	100	16	99
8	Venkatesan	15	100	17	99	17	100	15	100	15	99	17	100	17	100	15	99	18	99	16	100	15	100	15	100	17	99
9	Shankar	16	100	15	100	15	99	15	100	15	99	15	99	15	99	15	99	15	99	15	100	15	100	16	100	15	100
10	Anandan	15	99	15	99	15	99	16	100	15	99	15	99	15	99	15	99	15	99	15	100	17	99	15	99	15	99
11	Abdul	15	99	15	99	15	100	15	99	15	99	15	100	15	100	15	99	15	99	17	100	15	99	15	99	15	99
12	Dinakaran	18	100	17	100	16	100	17	99	15	99	16	100	16	100	15	99	15	99	15	100	15	99	18	100	17	100
13	Veerapathiran	15	99	18	100	15	100	15	99	15	99	15	100	15	100	15	99	17	99	15	100	15	100	15	99	18	100
14	Janaki	15	99	15	100	17	100	15	100	15	99	17	100	17	100	15	99	15	99	18	100	15	99	15	99	15	100
15	Sivasankar	17	99	15	100	15	100	17	99	15	99	15	100	15	100	15	99	15	100	15	100	15	99	17	99	15	100
16	Sudha	15	100	17	99	16	99	15	99	15	99	16	99	16	99	15	99	16	100	15	99	16	99	15	100	17	99
17	Nayagam	15	99	15	100	15	99	18	100	15	99	17	99	17	99	15	99	15	100	15	99	15	100	15	99	15	100
18	Pandian	16	100	15	99	15	99	15	99	15	99	15	99	15	99	15	99	15	100	15	100	15	99	16	100	15	99
19	Jeyakanthan	15	100	15	99	16	100	15	100	15	99	16	100	16	100	15	99	15	100	16	99	14	99	15	100	15	99
20	Thulasi	15	99	15	100	15	100	16	100	15	99	16	100	16	100	15	99	15	100	15	99	15	99	15	99	15	100
21	Alaudeen	15	100	16	100	15	100	17	100	15	99	16	100	16	100	15	99	16	100	19	99	15	100	15	100	16	100
22	Kamalakannan	17	99	15	100	18	100	15	100	15	99	18	100	18	100	15	99	15	100	15	100	18	100	17	99	15	100
23	Kannan	15	99	15	99	15	100	16	100	15	99	15	100	15	100	15	99	18	99	18	100	15	100	15	99	15	99
24	Manian	15	99	18	99	15	100	15	100	15	99	15	100	15	100	15	99	16	99	15	100	15	100	15	99	18	99
25	Marimuthu	18	100	15	99	15	100	15	99	15	99	17	100	17	100	15	99	15	99	15	100	17	100	18	100	15	99
26	Thanikaivel	15	99	15	99	15	100	15	99	15	99	15	100	15	100	15	99	15	99	17	100	15	100	15	99	15	99
27	Devadoss	15	99	15	99	15	100	15	99	15	99	15	100	15	100	15	99	15	99	15	100	15	100	15	99	15	99
28	Kumar	18	100	15	100	15	100	17	100	15	99	16	100	16	100	15	99	16	100	16	100	15	100	18	100	15	100
29	Kuttiammal	15	100	15	99	15	100	15	99	15	99	15	100	15	100	15	99	15	100	15	100	15	100	15	100	15	99
30	Rajni	15	99	15	99	19	99	15	99	15	99	15	99	19	99	15	99	15	99	15	99	15	100	15	99	15	99

GROUP M3

S.no	Name	3HR		4HR		5HR		6HR		7HR		8HR		9HR		10HR		11HR		12HR		16HR		20HR		24HR	
		RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2	RR	SPO2
1	Balamurugan	15	99	15	99	15	99	15	99	15	99	15	99	15	99	15	99	15	99	17	99	16	97	16	99	16	96
2	Nagappan	16	99	16	99	17	99	15	99	17	99	16	99	19	99	17	99	19	99	15	99	16	99	15	99	16	99
3	Logamanigandan	15	99	15	99	15	99	16	99	15	98	15	98	15	98	15	98	15	99	15	98	15	99	15	98	15	99
4	Kapoorsingh	15	100	16	98	15	99	15	99	16	98	15	98	15	98	16	98	15	99	16	98	15	97	17	97	15	97
5	Sadhasivam	15	98	15	98	18	98	15	98	15	98	17	98	16	98	15	98	16	98	15	98	17	98	15	98	17	98
6	Babusugirdaraj	17	100	17	98	15	98	16	98	15	98	15	98	16	98	15	98	15	98	16	98	15	97	15	98	15	98
7	Aruldoss	15	98	15	98	15	98	15	98	18	98	15	98	15	98	18	98	15	98	18	98	15	98	18	98	15	98
8	Venkatesan	15	99	15	99	15	98	15	99	15	98	18	98	17	98	15	98	17	98	15	98	17	97	15	99	17	97
9	Shankar	15	99	15	99	16	99	16	99	17	99	15	98	15	98	17	99	15	98	15	99	15	98	15	97	15	98
10	Anandan	18	99	18	98	15	99	15	99	15	99	15	98	15	98	15	99	15	98	18	99	16	98	16	99	16	98
11	Abdul	15	99	15	98	15	99	15	99	15	99	18	99	15	98	15	99	15	98	15	99	16	99	15	98	16	99
12	Dinakaran	15	99	15	99	18	98	17	99	16	98	15	99	16	98	16	99	16	98	17	98	15	99	15	97	15	99
13	Veerapathiran	15	99	15	99	15	99	15	98	16	98	15	99	15	98	15	99	15	98	15	98	15	97	16	99	15	98
14	Janaki	16	100	16	99	15	99	15	98	15	99	17	99	17	98	15	99	17	98	16	99	16	98	15	99	16	98
15	Sivasankar	15	100	16	98	17	99	18	98	18	99	15	98	16	99	18	99	16	99	15	99	15	99	15	98	15	99
16	Sudha	15	99	16	99	15	98	15	98	15	98	15	99	16	98	15	98	15	99	16	98	15	97	18	97	15	97
17	Nayagam	15	100	16	98	15	99	15	98	15	99	16	99	15	98	15	99	15	99	17	98	17	99	15	98	17	99
18	Pandian	19	99	19	99	16	99	19	99	17	99	15	99	17	98	17	99	17	98	15	98	15	99	15	97	15	99
19	Jeyakanthan	15	99	15	99	15	99	16	99	15	98	15	99	15	99	15	99	15	99	16	99	15	98	17	98	15	98
20	Thulasi	15	99	15	99	15	99	16	99	16	98	15	98	15	99	16	99	15	99	16	99	17	97	15	97	17	97
21	Alaudeen	15	99	15	98	16	99	16	99	15	99	16	99	18	99	15	99	18	99	15	99	15	97	15	98	15	98
22	Kamalakannan	15	99	15	98	15	99	15	99	15	99	15	99	15	99	15	99	15	99	15	99	18	98	16	99	18	98
23	Kannan	14	99	14	99	16	98	15	98	17	98	15	99	16	98	17	98	15	99	17	99	15	99	15	98	15	99
24	Manian	15	100	15	98	15	99	17	98	15	98	16	98	16	98	15	98	16	99	15	98	18	98	15	99	18	98
25	Marimuthu	15	98	15	98	17	99	15	98	15	98	15	99	15	98	15	98	15	98	15	98	15	98	16	97	15	98
26	Thanikaivel	15	100	15	99	15	98	15	98	18	98	15	99	15	98	18	98	15	98	16	99	15	97	15	99	15	97
27	Devadoss	16	99	16	99	15	99	16	98	15	99	16	99	16	98	15	99	16	98	15	99	16	98	15	98	16	98
28	Kumar	15	99	15	99	16	99	15	98	15	99	15	99	15	98	15	99	15	98	16	98	15	98	16	97	15	98
29	Kuttiammal	15	99	15	99	15	99	15	99	17	99	15	98	15	99	17	99	15	99	17	98	15	98	15	98	15	98
30	Rajni	15	99	15	99	15	99	15	99	15	98	16	99	18	99	15	98	15	99	16	98	16	98	15	97	16	99