"TO EVALUATE THE VALIDITY OF FULL CUP TEST FOR PAIN ASSESSMENT AGAINST VISUAL ANALOG SCALE AND VERBAL RATING SCALE AFTER SURGICAL REMOVAL OF IMPACTED THIRD MOLAR- DESCRIPTIVE OBSERVATIONAL STUDY"

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INDEX

LIST OF ABBREVIATIONS

Abbreviations	Full form
VAS	Visual Analog Scale
VRS	Verbal Rating Scale
FCT	Full Cup Test
NICE	National Institute of Clinical Evidence
cm	Centimeter
mm	Millimeter
NRS	Numeric Rating Scale
IASP	International Association for the study of pain
OMFS	Oral and Maxillofacial Surgeon
WBS	Wong-Baker Faces Pain Rating Scale
FPS	Faces Pain Scale
IASP	The International Association For The Study Of Pain

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Introduction

Surgical extractions are routine procedures in dentistry. They can be painful and cause discomfort to the patient after the procedure. It can be quite distressing for the patients because of postoperative difficulties such as pain, bleeding, trismus, swelling and alveolar osteitis[1].

Pain is a particular experience and there is not any tool to measure it[1]. The calculation of pain requires simple tools in low educated patients[2]. Pain is best measured by self-report and others are behavior and biological marker[3].

The assessment of pain helps in the selection of the appropriate treatment and for the evaluation of treatment efficacy[4].

Pain assessment is important because that is present when the individual experiencing it and it depends on the patient's self-report[5].

Pain calculation tools used for self-report can be unidirectional and multidirectional, the unidirectional is easy to use. Examples of unidirectional pain calculation tools are Visual Analog Scale (VAS), Verbal Rating Scales (VRS), Graphic Rating Scales, Numerical Rating Scales, Computer Rating Scales, Verbal Description Scales, Picture Scale and Coin Scales. A more recent pain calculation scale called "Full Cup Test" (FCT) has also been proposed for pain valuation[5].

Surgical removal of impacted third molars is the routine procedure carried out in oral and maxillofacial surgery. Pain, swelling, trismus are the most common complication after surgical removal of the third molar[6].

According to **Archer WH[7]** "a tooth which is completely or partially unerupted and is positioned against another tooth, bone or soft tissue so that its further eruption is unlikely, described according to its anatomic position". According to **Kramer RM and Williams AC[8]** incident of impacted mandibular third molars is found to be 41.13% which is considered very high.

The intensity of pain is without a doubt the most salient dimension of pain. Pain occurs within a context and other than intensity there are various factors important in pain experience. In cancer patients, the sensory component of pain is less important than the evaluative-emotional aspect. Pain intensity is influence by the meaning of the pain to the patient and its expected duration. The environment also has an impact on the experience of pain as do expectations, attitudes and beliefs.

Pain is rarely caused by psychological factors but is associated with psychological and emotional effects such as fear, anxiety and depression.

According to **National Institute of Clinical Evidence (NICE)** indication for removal of impacted third molar includes pathology such as unrestorable caries, untreatable pulpal and/or periapical pathology, cellulitis, abscess and osteomyelitis, internal/external resorption of the tooth or adjacent teeth, fracture of the tooth, disease of follicle including cyst/tumour[9].

While treating dental patients, alleviating pain is of utmost importance as it is prevalent and has far-reaching implications for both the patient and the clinician[10].

When the effects of the local anesthesia subside, the postsurgical pain begins and reaches peak levels in 6 to 12 hours postoperatively.

The major cause of pain is thought to be the release of inflammatory mediators that activates sensory nociceptors surrounding the tooth[11].

The pain measurement can be done by the Visual Analog Scale which has a significant validity. The Visual Analog Scale is presented as a 10-cm line, anchored by verbal descriptors, usually ‘no pain’ and ‘worst imaginable pain’. A 100 mm line to indicate pain intensity is marked by the patient. The score is measured from the zero anchors to the patient’s mark.

One of the limitations of the Visual Analog Scale is that it must be administered on paper or electronically. Caution is required when photocopying the scale as this can lead to significant changes in its length.

The Verbal Rating Scale comprises a list of adjectives used to denote increasing pain intensities - no pain; mild pain; moderate pain; and severe or intense pain are the words used to denote the pain intensity.

For ease of recording these adjectives are assigned numbers. These rank numbers can lead to the misapprehension that intervals between each descriptor are equal, but this is not the case and could be a source of error.

The Full Cup Test was introduced by **Ergün U, Say B, Ozer G, Yildirim O, Kocatürk O, Konar D et al in (2007)**[2] and they stated that Full Cup Test Scale for pain measurement is easy in low educated patients and also it requires further studies to evaluate the validity of the Full Cup Test pain scale for the measurement of pain following surgical removal of third molar.

The postoperative sequelae following third molar surgery can cause distress to the patient and affect the patient's quality of life after surgery for a limited period of time. The surgical technique performed in the most aseptic precautions does minimize the consequence of inflammation but are unable to prevent their manifestations.

As the pain is experienced after the effect of anesthesia reduces on postoperative period the measurement of pain can be done at that time with the help of pain scales. In this study Full Cup Test (FCT), Visual Analog Scale (VAS), Verbal Rating Scale (VRS) were assessed and compared. In the postoperative period the pain is at peak on the first day mostly and it also depends on various factors like operating time, position of tooth, postoperative antibiotic coverage. In this study the assessment

was done on first postoperative day on three different durations that is 1. 6 and 24 hour and patient is evaluated.

This study was conducted to evaluate the validity of Full Cup Test for pain assessment against Visual Analog Scale and Verbal Rating Scale after surgical removal of the impacted third molar.

Aim and Objectives

Aim of the study:

The aim of the study is to evaluate the validity of Full Cup Test for pain assessment against Visual Analog Scale and Verbal Rating Scale after surgical removal of impacted third molar.

Objectives of the study:

1. To compare Full Cup Test (FCT), Visual Analog Scale (VAS) and Verbal Rating Scale (VRS).

2. To evaluate the postoperative pain using three pain scales.

Review of Literature

Ohnhaus EE And Adler R in (1975)[12] said that the effect of analgesics on pathological pain in a double-blind, complete cross-over design was assessed by means of two rating scales, a Verbal Rating Scale (VRS) and Visual Analog Scale (VAS). The Verbal Rating Scale (VRS) is widely used but has several disadvantages as compared to the Visual Analog Scale (VAS). The results obtained in his study by means of the Verbal Rating Scale (VRS) showed higher F-ratios (analysis of variance and Kruskall-Wallis H-test) than those obtained by means of the Visual Analog Scale (VAS). The Verbal Rating Scale (VRS) it transfers a continuous feeling into a digital system, which seems to augment artificially the measurement of effects produced by analgesics, and the Visual Analog Scale (VAS) seems to assess more closely what a patient actually experiences with respect to change in pain intensities. The correlation between the two scales was highly significant ($r = 0.81$, $P -< 0.001$). The calculated regression line ($y = -29.6 + 0.55 . x$) was not same as the line of identity and showed

much lower values for the Visual Analog Scale (VAS), supporting their interpretation. There is no homogeneous distribution of the variances of the values obtained by means of both scales. This indicates that the homogeneity of the distribution of variances should always be checked and a KruskalI-Wallis H-test used if they are inhomogeneously distributed.

Seymour RA (1982)[13] used pain scales in assessing the efficacy of analgesics in post-operative dental pain. Two 10 cm Visual Analog Scales (VAS) were compared with a 0–10 point Numerical Rating Scale (NRS) and a four-point Verbal Descriptive Scale in assessing pain severity in patients with postoperative pain after surgical removal of lower third molar. High correlations were shown between the pain scores from the Visual Analog Scales (VAS) and the Numerical Rating Scale (NRS), but a lower correlation was obtained when the four-point scale was compared with the other scales. The type of the scale which is used is the dependent on analgesic efficacy. The 10 cm Visual Analog Scale (VAS) was more sensitive than other pain scales.

Berge TI in (1988)[14] conducted a study on Visual Analog Scale (VAS) assessment of postoperative swelling. In his study, subsequent to removal of impacted lower third molars the interrelationship of four postoperative variables (swelling, pain, trismus, and dysphagia) was assessed. He concluded that registration of postoperative swelling by means of a Visual Analog Scale (VAS) may be a sensitive and accurate method with obvious practical advantages.

Pedersen A in (1995)[15] evaluated swelling, pain, and trismus quantitatively after the removal of mandibular third molars on 30 healthy patients and concluded

from the study that the longer the operation time the more postoperative pain can be expected. However, neither swelling nor trismus was correlated with the length of time of operation. The degree of trismus or post-operative pain was not related to the swelling. The main reason for reduced mouth opening is postoperative pain.

Deloach LJ, Higgins MS, Caplan AB and Stiff JL in (1998)[16] concluded that the Visual Analog Scale (VAS) seems to be a valid tool for measurement of pain in the immediate postoperative period. It is easily understood and correlated well with an 11-point Verbal Scale.

Briggs M and Closs JS in (1999)[17] concluded that the ability to evaluate pain experiences is an essential feature. There are numerous methods of measuring and assessing pain. All tend to rely on the self-report as the most direct way to access the information required. Each method has strengths and limitations. They highlighted practical and conceptual problems regarding the use of Visual Analog Scale (VAS) in postoperative orthopedic patients. They provide useful data to guide decision making for professionals caring for patients undergoing orthopedic surgery.

Breivik Ek, Björnsson Ga and Skovlund E in (2000)[18] conducted a study for comparison of pain rating scales and concluded that in this acute pain model, the Verbal Rating Scale (VRS-4) was less sensitive than the Visual Analog Scale (VAS). The simulation result demonstrated similar sensitivity of the Numerical Rating Scale (NRS-11) and Visual Analog Scale (VAS) when comparing acute postoperative pain intensity. They said that the choice between the Visual Analog Scale (VAS) and Numerical Rating Scale (NRS-11) can thus be based on subjective preferences.

Chapman HR and Kirby-Turner N in (2002)[19] described the flexible use of Visual/Verbal Analog Scales (VAS) in dental surgery. It takes very little time to describe to the patient and seconds to use as a monitoring device during treatment. If used to address the individual's problems (fear/worry, fear of pain, fear of betrayal or lack of trust, poor self-esteem, and few positive coping strategies) that should have been identified during history taking, the result is a far more accurate understanding of the patient's perceptions by the dentist. In addition, the patient should feel better understood, less vulnerable and more cared for.

Bulloch B and Tenenbein M in (2002)[20] concluded that the assessment and treatment of pain in children is an important component of pediatric practice. To provide children with significant pain relief is inappropriate and that may lead to effect in treatment. The assessment of pain intensity is best given by self -report. The validation for 2 tools which was assessed for pediatric pain in the acute setting is given in this study.

Bosenberg A, Thomas J, Lopez T, Kokinsky E and Larsson LE in (2003)[21] concluded that the six-graded Faces Pain Scale (FPS) is a useful and valid instrument for measuring pain in children aged 4–12 years after treatment.

Comfort MB, Mcgrath C, Lo EC and Luo Y in (2003)[22] evaluated the performances of patient-centered outcome measures after oral surgery in a prospective cohort study of 100 patients and showed that although minor in nature, pain, swelling, and trismus are the most common postoperative complaints and influence the patient’s quality of life in days following surgery.

Coll AM, Ameen JR and Mead D in (2004)[23] concluded that common guidelines on the definition and measurement of pain are needed. In day surgery, the availability of a unified and reliable measure of pain that can address its sensory component, such as the Visual Analog Scale (VAS), will provide more accurate information for the pain experience and improve its management.

Satilmis T, Gonül O, Garip H, Altun A and Goker K in (2005)[24] studied the effectiveness of the submucosal application of tramadol, for acute postoperative facial pain, following the extraction of impacted third molar teeth. In this prospective, double-blind, randomized placebo-controlled study included 60 ASA I-II patients undergoing removal of impacted third molar. After the surgical procedure, patients were randomly divided into two groups; group T (1mg/kg tramadol) and group S (2-ml saline). Treatments were applied submucosally following surgery. Pain after extraction was evaluated using a Visual Analog Scale (VAS) 0.5,1,2,4,6,12,24 and 48 h postoperatively. The time at which the first analgesics drug was taken, the total analgesic dose used, and adverse tissue reactions were also evaluated. In group T, postoperative Visual Analog Scale (VAS) scores were significantly lower compared to that in group S ($p<0.05$). This study demonstrated that the post-operative submucosal application of tramadol is an effective method for reducing acute post-operative facial pain after impacted third molar surgery.

Williamson A and Hoggart B in (2005)[25] concluded that all three pain-rating scales are valid, reliable and appropriate for use in clinical practice, although the Visual Analog Scale (VAS) has more practical difficulties than the Verbal Rating Scale (VRS) or the Numerical Rating Scale (NRS). For general purposes, the

Numerical Rating Scale (NRS) has good sensitivity and generates data that can be statistically analyzed for audit purposes. Patients who seek a sensitive pain-rating scale would probably choose this one. For simplicity, patients prefer the Verbal Rating Scale (VRS), but it lacks sensitivity and the data it produces can be misunderstood.

Kim Jc, Choi Ss, Wang Sj and Kim Sg in (2006)[26] carried out a study to ascertain the incidence of minor complications after mandibular third molar surgery. One hundred and four patients subjected to surgical extraction of horizontally impacted lower third molars were selected and investigated by means of questionnaires and clinical examinations. They concluded that reduced opening of mouth over 10 mm at 1st postoperative day was significantly associated with the degree of tooth impaction. However, they also reported a few cases presenting limitations in mouth opening on the 7th postoperative day.

Sirintawat N, Sawang K, Chaiyasamut T and Wongsirichat N in (2007)[27] said that regardless of whether it is acute or chronic, the assessment of pain should be simple and practical. Since the intensity of pain is thought to be one of the primary factors that determine its effects on a human's overall function and sense, there are many scales to assess pain. The aim of the article was to review pain intensity scales that are commonly used in dental and Oral and Maxillofacial Surgery (OMFS). Previous studies demonstrated that multidimensional scales, such as the McGill Pain Questionnaire, short form of the McGill Pain Questionnaire, and Wisconsin Brief Pain Questionnaire were suitable for assessing chronic pain, while unidimensional scales, like the Visual Analog Scale (VAS), Verbal Descriptor Scale, Verbal Rating

Scale (VRS), Numerical Rating Scale (NRS), Faces Pain Scale (FPS), Wong-Baker Faces Pain Rating Scale (WBS), and Full Cup Test (FCT), were used to evaluate acute pain. The Wong-Baker Faces Pain Rating Scale (WBS) is widely used to assess pain in children and the elderly because other scales are often difficult to understand, which could consequently lead to an overestimation of the pain intensity. In dental or Oral and Maxillofacial Surgery (OMFS) research, the use of Visual Analog Scale (VAS) is more common because it is more reliable, valid, sensitive, and appropriate. However, some researchers use Numerical Rating Scale (NRS) to evaluate Oral and Maxillofacial Surgery (OMFS) pain in adults because this scale is easier to use than Visual Analog Scale (VAS) and yields relatively similar pain scores. This review assessed Pain Scales used for post-operative Oral and Maxillofacial Surgery (OMFS) or dental pain.

Ergün U, Say B, Ozer G, Yildirim O, Kocatürk O, Konar D et al in (2007)[2] said that pain is subjective and pain assessment depends on the patient's self-report. In patients with low education they require simple tool for pain measurement. There are limited reports about pain assessment in these types of patients. The aim of his study was to develop a Pain Scale that is easy for patients with low education to understand and to evaluate its usefulness in these patients. A total of 128 adult non-demented patients presenting with headaches or rheumatologic pain were included in the study. This study involved 114 patients in the first phase and aimed to evaluate the usefulness of the Full Cup Test (FCT) compared with the Visual Analog Scale (VAS). The second phase of the study involved 23 patients with headaches selected randomly from the 114 patients and assessed the usefulness of the Full Cup Test (FCT) for detecting changes in pain levels. The third phase of the study

involved 14 patients with low education suffering from headaches and examined the usefulness of the Full Cup Test (FCT) in these patients. The mean Visual Analog Scale (VAS) and Full Cup Test (FCT) scores were statistically correlated and reliable and did not differ significantly. Patients with low education understood the Full Cup Test (FCT) more easily than the Visual Analog Scale (VAS). They concluded that the Full Cup Test (FCT) is useful for both assessing and differentiating changes in pain, and is suitable for assessing pain in patients with low education.

Lago-Méndez L, Diniz-Freitas M, Senra-Rivera C, Gude-Sampedro F, Rey JM and García-García in (2007)[28] showed a statistically significant relationship between duration of surgery and postoperative pain on 1st postoperative day and observed in their patients that pain subsequently declined steadily until the 7th postoperative day when the sutures were removed. They have also mentioned that the differing results obtained in various studies may reflect differences in the type of anesthetic used and in the analgesic administered after surgery. The ideal study design will involve the elimination of postoperative analgesics which is not possible for ethical reasons.

Breivik H, Borchgrevink PC, Allen SM, Rosseland LA, Romundstad L, Breivik Hals EK et al in (2008)[29] said that adequate assessment of pain using validated tools appropriate to the population or person is an important prerequisite of pain management. Inadequate pain assessment is common with resultant failings in the management of pain. Only by regularly assessing and measuring pain as routinely as the other vital signs make pain visible enough to those caring for patients and thus

improve management. This is especially true for patients with acute pain after surgery, trauma, and in the intensive care unit.

Subhashini L, Vatsa M and Lodha R in (2008)[30] compared the Faces Pain Scale (FPS) and Color Analogue Scale (CAS) among children aged 6-12 years undergoing selected procedures (Venipuncture, Bone marrow aspiration, Intravenous cannulation,, Lumbar puncture, Intramuscular injection) and to compare the pain during procedure in a child as perceived by the child, parents and health care professionals with the pain measurement scales and concluded that the study findings support the utility of obtaining child self- report of pain and show that both Faces Pain Scale (FPS) and the Color Analog Scale (CAS) were appropriate tools used for assessment of pain among children age 6-12 years undergoing selected procedures among Indian population. The parents and health care professionals are reliably able to assess the procedure-related pain among children by using the same pain scales Faces Pain Scale (FPS) and the Color Analog Scale (CAS).

Miró J, Castarlenas E and Huguet A in (2009)[31] in the study said that the Numerical Rating Scale (NRS) 11 has an acceptable level of validity for measuring pain intensity and further research is needed for fully clarification on the lower age limit in which the Numerical Rating Scale (NRS) 11 can be used.

Dijkers M in (2010)[32] concluded that there are considerable differences between individuals how Numerical Rating Scale (NRS) and Verbal Rating Scale (VRS) are used there also seem to be individuals whose understanding of the meaning of the Verbal Rating Scale (VRS) adjectives is completely different from what was assumed by the creators of this Verbal Rating Scale (VRS). Both Verbal Rating Scale

(VRS) and Numerical Rating Scale (NRS) data must be used with extreme caution by SCI clinicians and researchers.

Ferreira-Valente MA, Pais-Ribeiro JL and Jensen MP in (2011)[33] compared the relative validity of Visual Analog Scale (VAS), Numerical Rating Scale (NRS), Verbal Rating Scale (VRS), and Faces Pain Scale (FPS)-R for detecting differences in painful stimulus intensity and differences between men and women in response to experimentally induced pain. The findings are consistent with previous studies supporting the validity of each scale.

Bortoluzzi MC, Guollo A, Capella DL and Manfro R in (2011)[34] evaluated the pain course after surgical removal of third molars in 100 consecutive patients. Pain intensity was assessed by means of a Visual Analog Scale (VAS). At day 1, moderate and severe pain were observed predominantly in patients who had surgery in the mandible ($p<0.001$) and for patients younger than 24 years ($p=0.009$), while more patients who weekly consumed mate tea (Ilex paraguariensis) showed pain classified as none or light ($p=0.017$). On day 2, the profile of pain moderate/severe was more prevalent for patients who had surgery in the mandible ($p<0.001$) with the report of difficult surgery ($p=0.042$) and with odontotomy performed ($p=0.003$). In the third postoperative day, severe/moderate pain was associated with surgery in the mandible ($p<0.001$) and with odontotomy ($p=0.021$) and ostectomy ($p=0.028$) performed, with report of long and difficult procedure ($p=0.023$), surgeries which last more than sixty minutes ($p<0.026$), and for those patients who developed postoperative inflammatory complications ($p<0.001$). They concluded that third molar surgery performed in maxilla and mandible is also unequal concerning pain response.

Higher pain complains could be expected for patients who have difficult mandibular surgery and that means an increase in trauma and procedure time spent. Regular mate tea consumption may have an anti-inflammatory and/or analgesic effect.

Garra G, Singer AJ, Domingo A and Thode HC in (2013)[35] concluded that the concern over the impact of affect-laden anchors in Faces Pain Scales is established and understandable. An appropriate tool should neither overstate nor underreport pain severity. Likewise, an appropriate measurement tool should not report nonnociceptive experiences. In their study, the Wong-Baker Scale (WBS) correlated reasonably well with a Visual Analog Scale (VAS) and did not appear to be mistaken for fear. Despite the concern for underreporting of pain severity, the Wong-Baker Scale (WBS) appears to provide valid estimates of pain when concurrently measured with a Visual Analog Scale (VAS) among school-aged children. Within the limits of their study, there is no reason to believe that severity reporting on the Wong-Baker Scale (WBS) is confounded by fear. Their results suggested that school-aged children are able to discriminate pain from fear when completing pain severity scales.

De Santana-Santos T, De Souza-Santos JA, Martins-Filho PR, Da Silva LC, E Silva ED And Gomes AC in (2013)[36] investigated the relationship between preoperative findings and short-term outcome in third molar surgery and concluded that outcomes of third molar operations such as swelling, trismus and pain differ depending on the patients characteristics age, gender, and body mass index and surgery characteristics such as operating time and tooth sectioning were also associated with postoperative variables.

Odai ED, Ehizele AO and Enabulele JE in (2015)[5] said that pain is considered as a key symptom associated with possible impairment of oral-health-related quality of life and its assessment is important for the planning and evaluation of preventive and treatment effort. The tools for assessing pain must, therefore, be valid and consistent. The objective of his study was to assess dental patient's level of pain based on the clinical diagnosis of their dental condition and the correlation between two pain assessment scales, Visual Analog Scale (VAS) and the Full Cup Test (FCT), for the assessment of pain among dental patients. They concluded that patients who presented with either acute or chronic dental conditions may experience moderate to severe levels of pain, with patients with multiple diagnoses experiencing more severe pain, and there is a correlation between the Visual Analog Scale (VAS) and the Full Cup Test (FCT) for pain assessment among dental patients.

Al-Samman AA, Al-Nuaime OS and Othman HA in (2016)[4] said that pain assessment by clinicians can be difficult as it is subjective and depends on the patient's self-report. The aim of his study was to evaluate the validity and reliability of a pain-rating scale; the Full Cup Test (FCT) and compare its performance to other scales in assessing pain following dental surgery. The ease of using this pain scales was compared. Forty-three patients who have had different dental surgeries were included in his study and all patients asked to complete Five Pain Scales: Faces Pain Scale (FPS), Numeric Rating Scale (NRS), Visual Analog Scale (VAS), Verbal Rating Scale (VRS), and Full Cup Test (FCT) for seven consecutive days starting on the day of the surgery. The analysis of variance (One-way ANOVA test), correlation between different scales (Pearson correlation), and reliability (Cronbach alpha) of Full Cup Test (FCT) was evaluated and concluded that the scales correlated highly with

each other (P < 0.001). The Full Cup Test (FCT) was highly reliable (Cronbach ›S Alpha= .970) and was found to be the easiest scale to use. The Full Cup Test (FCT) is valid, reliable and relatively easy to use pain scale in this group of patients. It can be used to .assess pain intensity interchangeably with other pain rating scales.

Kumar KH and Elavarasi P in (2016)[37] concluded that as very well written in the title of the article by Caudill "Managing pain before it manages you," it becomes very crucial to identify and diagnose pain and its related disorders to bring about the right and effective method of pain control. It is imperative for medical and dental practitioners to address every patient's chief complaint and deliver definite treatment.

Al-Samman AA and Othman HA in (2017)[38] concluded that some patients found the Full Cup Test (FCT) difficult and facial expression drawings are valid ways to assess swelling interchangeably with other scales.

Lim KH, Salahudin MS and Hariri F in (2017)[39] they evaluated the suitability of Full Cup Test (FCT), Numeric Rating Scale (NRS), and Visual Analog Scale (VAS) to assess pain after surgical removal of lower third molar and to identify which of these three pain scales is the easiest to use. A total of 50 patients, age between 18 to 30 years who underwent minor oral surgery for removal of impacted third molar were assessed in the study. The patients were provided with forms containing three pain scales and they were required to mark each pain scales – Full Cup Test (FCT), Numeric Rating Scale (NRS), and Visual Analog Scale (VAS) daily for three consecutive post-operative days. The forms were collected a week later when patients came back for review. The validity of Numeric Rating Scale (NRS)

with Visual Analog Scale (VAS), Full Cup Test (FCT) with Numeric Rating Scale (NRS) and Full Cup Test (FCT) with Visual Analog Scale (VAS) was tested using the Spearman rank correlation coefficient. Results showed that the correlation coefficient values for each pair were very high and significant. The findings when comparing Day 1, Day 2 and Day 3 and the combination for those three days showed no significant differences. No evidence indicated that the findings for Day 1 were more superior in comparison with other days and concluded that Full Cup Test (FCT) was as valid as Numeric Rating Scale (NRS) and Visual Analog Scale (VAS). The pain scale which was claimed to be the easiest to use by patients was Numeric Rating Scale (NRS), followed by Full Cup Test (FCT) and Visual Analog Scale (VAS). However, further studies are needed to investigate the reliability and sensitivity of Full Cup Test (FCT).

Materials and Method

A Descriptive Observational Study was designed to study the validity of Full Cup Test for pain assessment against Visual Analog Scale and Verbal Rating Scale after surgical removal of impacted third molar.

SAMPLE SIZE –

Minimum 60 patients visiting the Department of Oral and Maxillofacial Surgery under inclusion criteria will be included in the study.

STUDY DESIGN-

Descriptive Observational Study.

DURATION OF STUDY-

The study was performed for a period of 18 months from 1st January 2018 to 30th June 2019.

INCLUSION CRITERIA –

- Patients indicated for surgical removal of the impacted third molar.
- Patients of 18 years of age and above (male and female) without any systemic condition.

EXCLUSION CRITERIA –

- Patients with known allergy to Local anesthetic solution, antibiotic and analgesic.
- Mentally challenged patients.
- Patient not willing to volunteer for the study.
- Patients with periapical infection.
- Patients with periodontal diseases.

MATERIALS -

- Pain evaluation Proforma.
- Diagnostic instruments.
- 25 Gauge long needle 2ml syringe.
- Local anesthetic solution.
- Surgical exodontia armamentarium for extractions.
- Suture (Mersilk 3-0) (Johnson and Johnson)

PROCEDURE -

PRE-OPERATIVE-

- Patients will be selected fulfilling the inclusion criteria.
- After proper case recording the surgical procedure will be thoroughly explained to the patient.
- Informed consent will be taken from the patient before the surgical procedure.

INTRAOPERATIVE AND POSTOPERATIVE-

- Under all aseptic precautions, the patient is prepared for surgery, the patient will be administered a Local anesthetic solution.
- Surgical extraction of the third molar will be performed.
- All the patients will receive antibiotics and analgesics postoperatively.
- Explain the patient about the written proforma that the patient has to fill the form after 1 hour of procedure and later 6 hours and 24 hours.

METHODS OF MEASUREMENTS –

FULL CUP TEST (FCT)

- Drawing of a cup is used.
- The patient is asked to draw a horizontal line on the cup or asked to fill the cup to indicate the pain level as the cup is empty when there is no pain and completely full when there is severe pain.

- The height of the cup is taken as 10 cm the same as in VAS.
- FCT SCORE IS CALCULATED AS: $\frac{\text{HEIGHT OF LINE}}{\text{HEIGHT OF CUP}} \times 100$
- The maximum score was 100% when a value of 10 is given.[5]

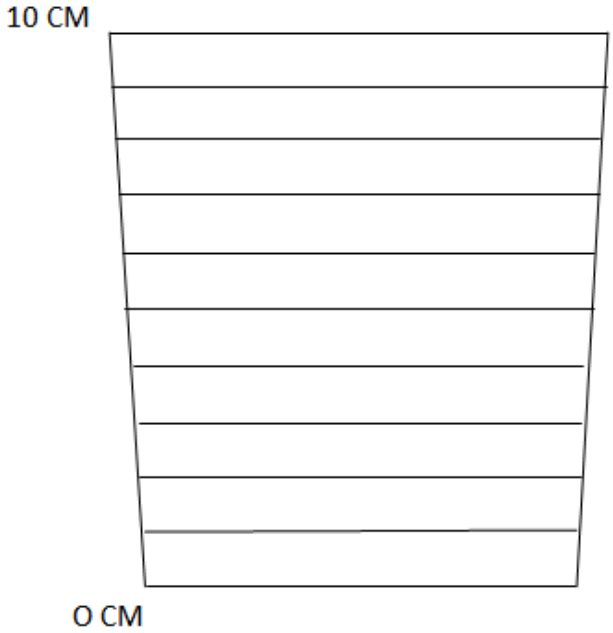


Figure A -Full Cup Test (FCT) For Pain Measurement

VISUAL ANALOG SCALE (VAS)

- VISUAL ANALOG SCALE is a 10 cm horizontal line that starts with no pain and ends with severe pain.
- The patient has to mark on the line to indicate pain.

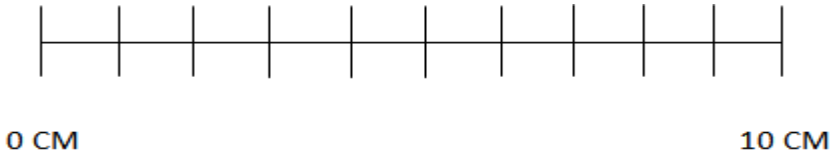


Figure B -Visual Analog Pain Rating Scale (VAS)

- 0 CM – NO PAIN
- 1 – 3 CM – MILD PAIN
- 4 – 6 CM – MODERATE PAIN
- 7 – 10 CM – SEVERE PAIN

VERBAL RATING SCALE (VRS)

- VERBAL RATING SCALE (VRS) has 4 verbal expressions that will be selected by patients.
- 0 – NO PAIN
- 1 – MILD PAIN
- 2 – MODERATE PAIN
- 3 – SEVERE PAIN

STATISTICAL ANALYSIS-

Statistical Package for Social Science (SPSS) version 21 for Windows (Armonk, NY: IBM Corp) software was used to analyze the data.

Statistical analysis was done by using tools of descriptive statistics such as Mean, and SD for representing quantitative data.

Probability $p<0.05$, considered as significant as the alpha error set at 5% with a confidence interval of 95% set in the study. Power of the study was set at 80% with beta error set at 20%

The normality of data was checked using the Shapiro Wilk test.

Pearson 'r' correlation coefficient test was used to find a correlation (reliability) among three pain scales recorded at three different time intervals.

A chi-square test was used to find an association between educational status and subjective liking for a particular pain scale.

Chi-square test was used to find out statistical significant difference exist for the subjective liking of a particular pain.

COLOUR PLATE 1

Figure C- Surgical Exodontia Armamentarium For Extraction

Results

This study was carried out in 60 patients undergoing surgical removal of the mandibular third molar over a period of 18 months starting from 1st January 2018 to 30th June 2019.

All the patients in this study were given the assessment form and the assessment form was filled by the patients in given time interval of 1, 6 and 24 hour. All the data were recorded and statistical analysis was done. All the patients were examined postoperatively and suture removal was done on the 7th postoperative day.

Table 1 gives a comparison of correlation among Full Cup test (FCT), Visual Analog Scale (VAS) and Verbal Rating Scale (VRS) in relation to measurements of 1-hour postoperative pain after surgical extraction of third molar using Pearson 'r' correlation test. On comparison of correlation among Full Cup test (FCT), Visual Analog Scale (VAS) and Verbal Rating Scale (VRS) in relation to measurements of

1-hour postoperative pain after surgical extraction of third molar using Pearson 'r' correlation test, this showed that there is strong highly statistical significant ($p<0.001$) correlation exists between three measurement tools. As the pain measured in one scale is high, it also showed high in other scales. In this way all the three pain scales were highly correlated. The graphical representation of this data is depicted through a column chart in **graph 1**.

Table 2 gives a comparison of correlation among Full Cup test (FCT), Visual Analog Scale (VAS) and Verbal Rating Scale (VRS) in relation to measurements of 6 hours postoperative pain after surgical extraction of third molar using Pearson 'r' correlation test. On comparison of correlation among Full Cup test (FCT), Visual Analog Scale (VAS) and Verbal Rating Scale (VRS) in relation to measurements of 6-hour postoperative pain after surgical extraction of third molar using Pearson 'r' correlation test, strong highly statistical significant ($p<0.001$) correlation exists between three measurement tools. **Graph 2** showed the graphical representation through the column chart.

Table 3 gives a comparison of correlation among Full Cup test (FCT), Visual Analog Scale (VAS) and Verbal Rating Scale (VRS) in relation to measurements of 24 hours postoperative pain after surgical extraction of third molar using Pearson 'r' correlation test. On comparison of correlation among Full Cup test (FCT), Visual Analog Scale (VAS) and Verbal Rating Scale (VRS) in relation to measurements of 24-hour postoperative pain after surgical extraction of third molar using Pearson 'r' correlation test, strong highly statistical significant ($p<0.001$) correlation exists

between three measurement tools. The graphical representation is depicted through a column chart in **graph 3.**

In the above findings this is stated that all the three pain measurement scale Full Cup Test (FCT), Visual Analog Scale (VAS) and Verbal Rating Scale (VRS) are strongly correlated and highly statistically significant. All the three pain measurement scale is valid for measuring postoperative pain after surgical removal of third molar.

Table 4 provides the details of a comparison of subjective liking for pain measurement scale for recording postoperative pain after surgical extraction of the third molar. On comparison of subjective liking for pain measurement scale for recording postoperative pain after surgical extraction of the third molar, 38.34 % preferred the Full Cup Test (FCT) scale followed by the Verbal Rating Scale (VRS) scale (35%) and the least preference was given to Visual Analog Scale (VAS) score (26.66%). There was no statistically significant ($p>0.05$) difference found for subjective preference for any of the three types of the pain scale. All the three pain scale is preferred by the patients and on the basis of above findings it can be stated that the Full Cup Test (FCT) is as valid as other pain scales**.** .The graphical representation is depicted in **graph 4** through the column chart**.**

Based on the above findings this can be stated that Full Cup Test (FCT) pain scale is preferred more than Visual Analog Scale (VAS) and Verbal Rating Scale (VRS) in patients with surgical removal of third molar.

Table 5 provides the details of descriptive statistics of the reason for the subjective liking of a particular pain measurement scale for recording postoperative pain after surgical extraction of the third molar. For the Full cup Test (FCT) scale, the

reason for liking this scale was being easy (52.2%), good (30.4%), simple (13%) and understandable (4.3%). For the Visual Analog Scale (VAS) scale, the reason for liking this scale was easy (25 %), good (31.2%), simple (43.8 %) and understandable (0 %). For the Verbal rating Scale (VRS) scale, the reason for liking this scale was easy (42.9 %), good (19 %), simple (38.1 %) and understandable (0 %). The statistics showed that more patients find Full Cup Test (FCT) easy followed by Verbal Rating Scale (VRS) and Visual Analog Scale (VAS).

The graphical representation is depicted through the column chart in **graph 5.**

Table 6 gives the association of education level with a subjective liking for a particular pain measurement scale for recording postoperative pain after surgical extraction of the third molar**.** In low education category groups subjects, 48.1% preferred the Full cup Test (FCT) scale followed by the Verbal rating Scale (VRS) scale (33.3%) and Visual Analog Scale (VAS) scale (18.5%).On the association of education level with a subjective liking for a particular pain measurement scale for recording postoperative pain after surgical extraction of the third molar, there was no statistically significant association found between education level and subjective liking for particular pain measurement scale. Most low education category subjects prefer the Full cup Test (FCT) scale (48.1%). Highly educated category subjects equally prefer all three scales. The graphical representation is depicted through a column chart in **graph 6.**

Hence, this study showed that the Full Cup Test (FCT) is valid for pain assessment and on comparison of all the three pain scales Full Cup Test (FCT) is

more preferred and most of the patients were low educated. So, Full Cup Test (FCT) is a valid tool for pain assessment and it can be used for pain assessment after surgical removal of third molar.

Table 1 - Comparison Of Correlation Among FCT, VAS, And VRS In Relation To Measurements Of 1-Hour Postoperative Pain

1-hour interval	FCT SCALE	VAS SCALE	VRS SCALE
FCT SCALEvs	----	r = 0.913 p <0.001**	r = 0.838 p<0.001**
VAS SCALEvs	r =0.913 p<0.001**	----	r =0.839 p<0.001**
VRS SCALEvs	r =0.838 p<0.001**	r =0.839 p<0.001**	----

Pearson 'r' correlation test, *p<0.05 – significant correlation,p<0.001 –highly significant correlation**

Table 2 - Comparison Of Correlation Among FCT, VAS, And VRS In Relation To Measurements Of 6-Hour Postoperative Pain

6-hour interval	FCT SCALE	VAS SCALE	VRS SCALE
FCT SCALEvs	----	r = 0.932 p <0.001**	r = 0.893 p<0.001**
VAS SCALEvs	r =0.932 p<0.001**	----	r =0.903 p<0.001**
VRS SCALEvs	r =0.893 p<0.001**	r =0.930 p<0.001**	----

Pearson 'r' correlation test,*p<0.05 – significant correlation,p<0.001 –highly significant correlation**

Table 3 - Comparison Of Correlation Among FCT, VAS, And VRS In Relation To Measurements Of 24-Hour Post-Operative Pain

24-hour interval	FCT SCALE	VAS SCALE	VRS SCALE
FCT SCALEvs	----	r = 0.904 p <0.001**	r = 0.782 p<0.001**
VAS SCALEvs	r = 0.904 p<0.001**	----	r = 0.795 p<0.001**
VRS SCALEvs	r = 0.782 p<0.001**	r =0.795 p<0.001**	----

Pearson 'r' correlation test,*p<0.05 – significant correlation,p<0.001 –highly significant correlation**

Table 4 - Comparison Of Subjective Liking For Pain Measurement Scale For Recording Post-Operative Pain

	Number (n)	Percentage (%)	Chi square test	p value, Significance
FCT SCALE	23	38.34%	Chi square test = 1.30	P value =0.522
VAS SCALE	16	26.66%		
VRS SCALE	21	35%		

p>0.05 – no significant difference ***p<0.05 – significant difference**

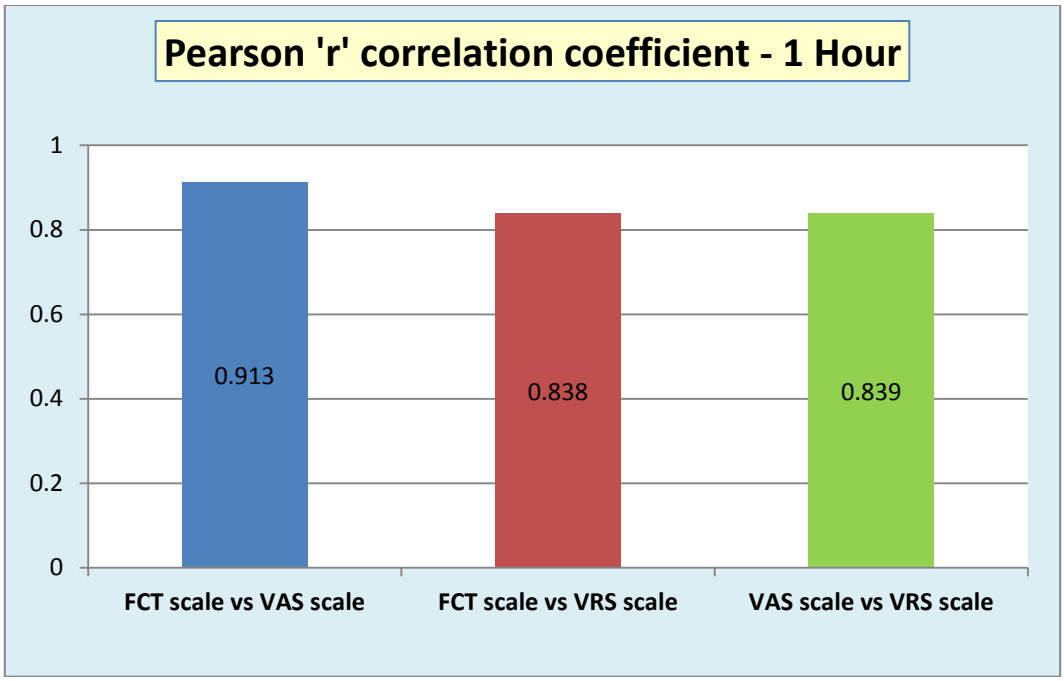
Table 5 - Descriptive statistics of the reason for the subjective liking of a particular pain measurement scale for recording post-operative pain

	Easy n (%)	Good n (%)	Simple n (%)	Understanding n (%)
FCT SCALE	**12 (52.2%)**	**7 (30.4%)**	**3 (13%)**	**1 (4.3%)**
VAS SCALE	**4 (25%)**	**5 (31.2%)**	**7 (43.8%)**	**0 (0%)**
VRS SCALE	**9 (42.9%)**	**4 (19%)**	**8 (38.1%)**	**0 (0%)**

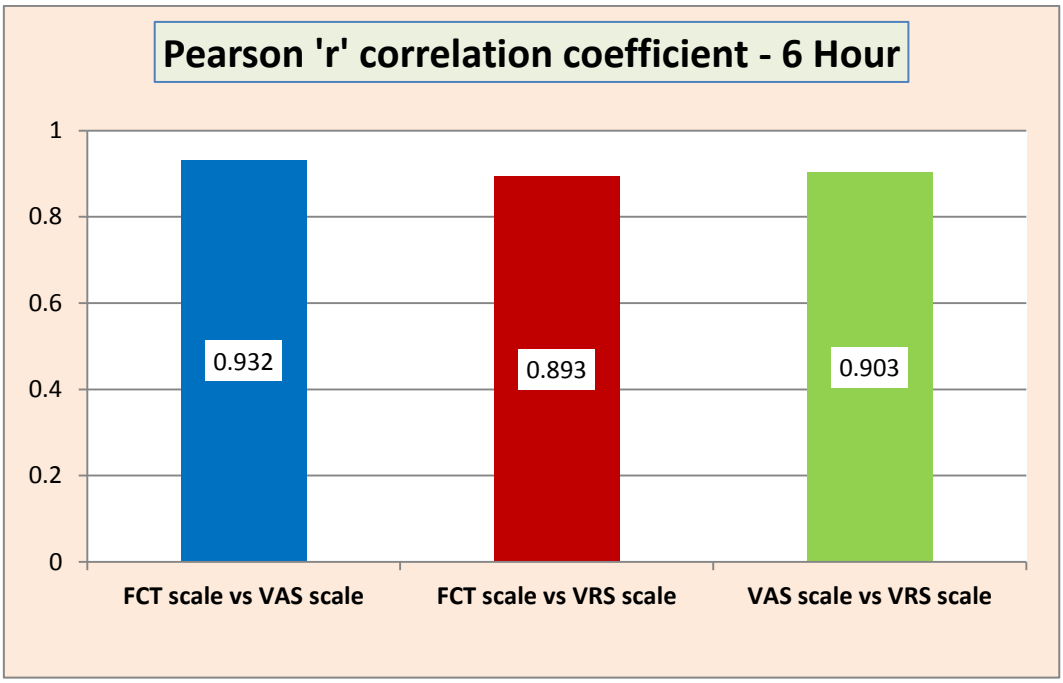
Table 6 - Association Of Education Level With A Subjective Liking For Particular Pain Measurement Scale For Recording Post-Operative Pain

	Low Education category (n=27) n (%)	Highly education category (n=33) n (%)	Chi square test	p value, Significance
FCT SCALE (n=23)	13 (48.1%)	10 (30.3%)	Chi = 2.495	p =0.287
VAS SCALE (n=16)	5 (18.5%)	11 (33.3%)		
VRS SCALE (n=21)	9 (33.3%)	12 (36.4%)		

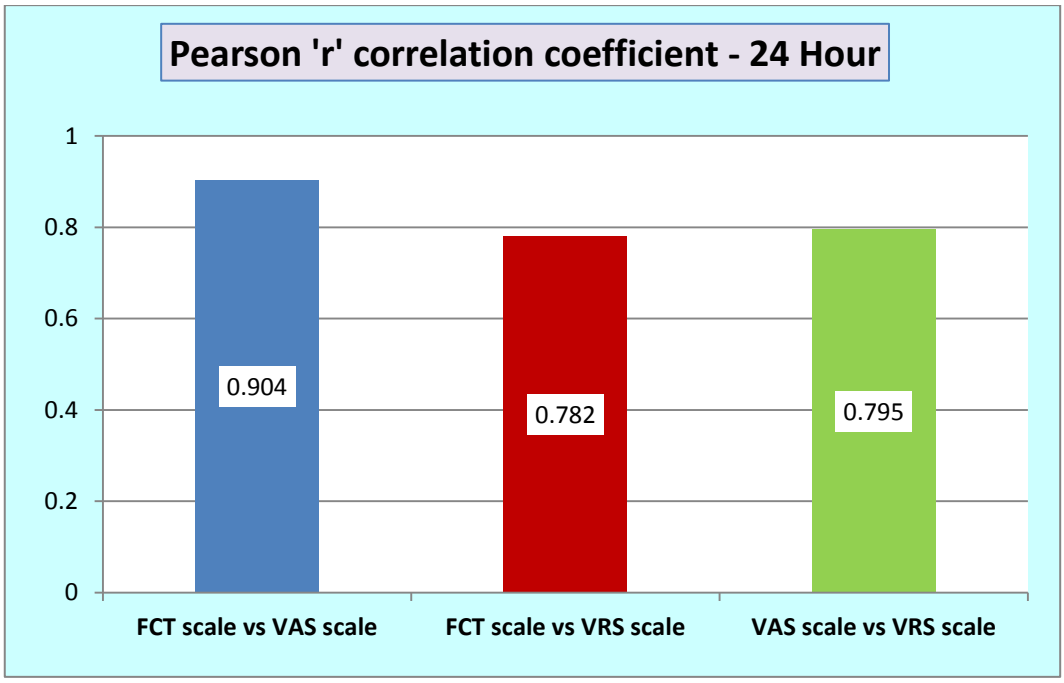
p>0.05 – no significant difference ***p<0.05 – significant difference**



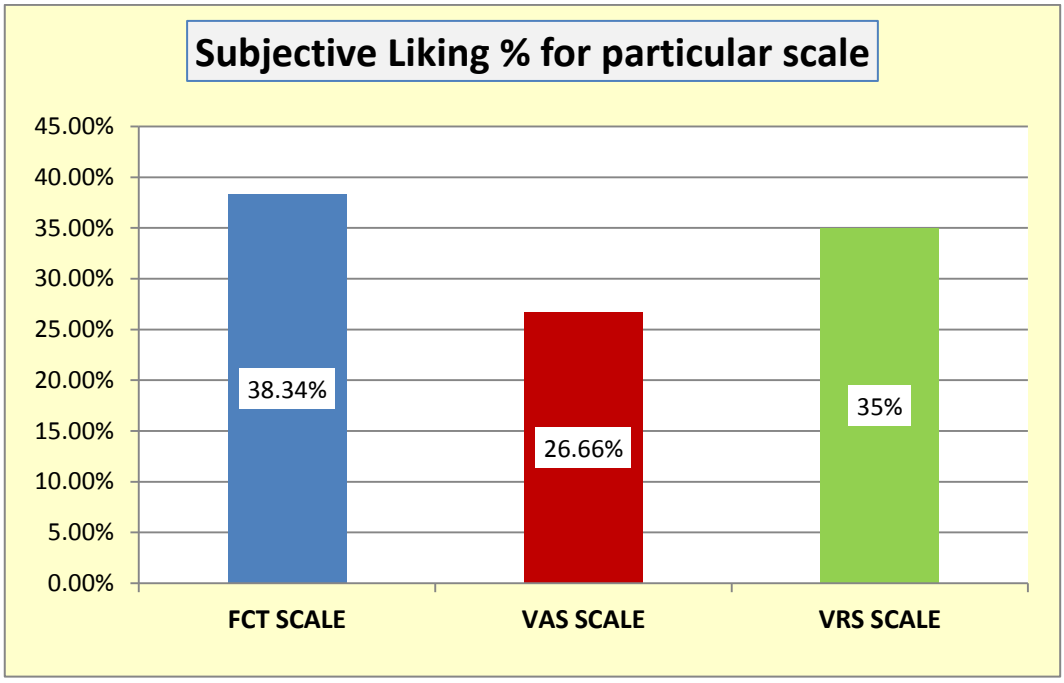
Graph I - Column Chart Showing Comparison Of Correlation Among FCT, VAS, And VRS In Relation To Measurements Of 1-Hour Postoperative Pain



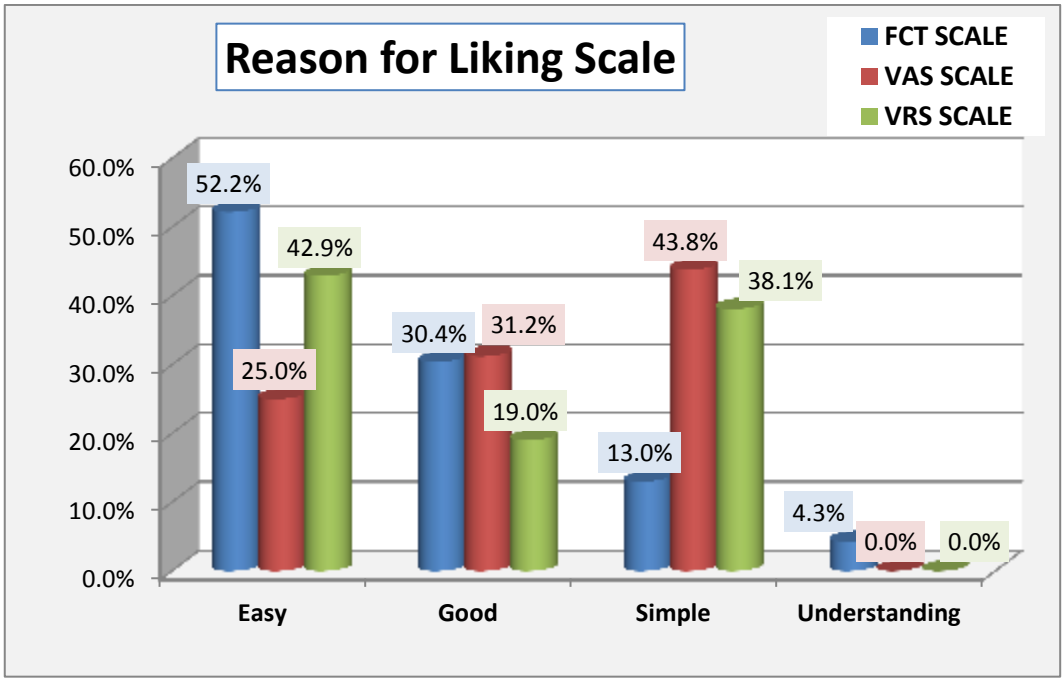
Graph II - Column Chart Showing Comparison Of Correlation Among FCT, VAS, And VRS In Relation To Measurements Of 6-Hour Postoperative Pain



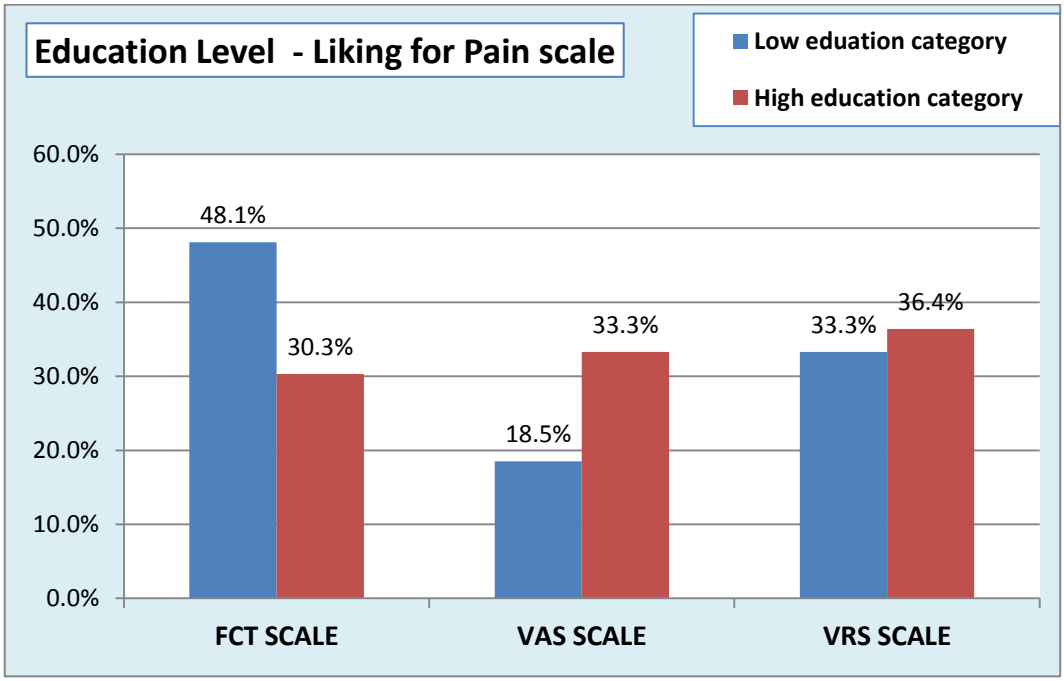
Graph III - Column Chart Showing Comparison Of Correlation Among FCT, VAS, And VRS In Relation To Measurements Of 24-Hour Post-Operative Pain



Graph IV - Column Chart Showing Comparison Of Subjective Liking For Pain Measurement Scale For Recording Post-Operative Pain



Graph V - Column Chart Showing Descriptive Statistics Of The Reason For The Subjective Liking Of A Particular Pain Measurement Scale For Recording Post-Operative Pain



Graph VI - Column Chart Showing Association Of Education Level With A Subjective Liking For Particular Pain Measurement Scale For Recording Post-Operative Pain

Discussion

Third molars extraction is one of the most common procedures performed by oral and maxillofacial surgeons[40]. There are several postoperative complications encountered with the removal of the third molar[41]. Commonly associated post-operative sequelae involve pain, trismus, and swelling. These are directly related to the difficulty factor associated with impacted teeth, duration of surgery, age of the patient and expertise of the surgeon. Trismus following surgical extraction is secondary due to pain and swelling[42].

Pain after the removal of the third molar is because of trauma-induced inflammation. The various authors have stated different scales for studying the intensity of pain. **Bortoluzzi MC, Guollo A, Capella DL and Manfro R in (2011)[34]** studied the intensity of pain after surgical removal of third molars by using the Visual Analog Scale (VAS).

The broadly accepted definition of pain from **The International Association For The Study Of Pain (IASP)** illustrates pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage". Importantly, pain is a psycho-biological phenomenon which constitutes: "If they consider their experience as pain and if they describe it in the same ways as pain sourced by tissue damage, it should be acknowledged as pain. This definition evades tying pain to the stimulus. Actions induced in the nociceptor and nociceptive pathways by a noxious stimulus are not pain, which always is a psychological state, although we may well appreciate that pain most often has a contiguous physical cause[43]".

In the earlier time pain scale used was Visual Analog Scale (VAS) and Numerical Rating Scale (NRS) but as the disadvantages of these scales were come into notice the authors developed and tried a new tool for pain measurement Full Cup Test (FCT). Full Cup Test (FCT) was developed in 2007 and the authors first tried this pain scale and conducted a study in comparison with other pain scale and reach the conclusion that this scale can be used for pain assessment. And nowadays this scale is the most valid pain assessment tool.

Seymour RA (1982)[13] discussed that the patients who have undergone removal of impacted lower third molars provide a suitable out-patient model for testing analgesics. With such patients, the same operation is performed on two separate occasions: since the amount of operative trauma and subsequent post-operative pain is broadly comparable on each occasion, the patient can act as his own control in a crossover trial. Patients who have undergone removal of their impacted

lower third molars experience their most marked pain in the first 12 h after the operation. There are problems in finding sufficient numbers of patients with bilaterally similar impacted lower, third molars suitable for participating in an analgesic assay. The limited supply may prolong the study. The purpose of the present study was to evaluate three different methods of measuring pain and to determine whether the efficacy of the analgesic being tested was dependent upon, or varied between them. In a placebo-controlled crossover study, the sensitivity of a five point Verbal Rating Scale (VRS) and a Visual Analog Scale (VAS) were compared their results showed the 5-point Verbal Rating Scale of pain relief produced higher variance ratios in a one-way analysis of variance than did the Visual Analog Scale method. Similarly, they also showed a greater dynamic range than the Visual Analog Scale, which may be interpreted as a further indication of superior sensitivity. In spite of these findings, the authors concluded that the superior sensitivity of the 5-point scale was artifactual and that the Visual Analogue Scale was more appropriate for recording pain, or pain relief. No explanation or evidence was offered for selecting this interpretation over an alternative.

Chapman HR and Kirby-Turner N in (2002)[19] In this article they described the flexible use of the 'thermometer' self-report measures during clinical situations. (For older children and adults the term 'numerical/visual analogue scale' is more appropriate). Limits are set to the thermometer with 0 being 'not believing/trusting at all' and 10 being 'completely believing/trusting'. Alternatively, 10 could be 'the dentist being very, very sneaky' and 0 being 'not sneaky at all.' The self-esteem thermometer should only be used at the end of a treatment section/session to boost self-esteem in those reluctant to take credit for their progress. Its use is best confined

to children as adults may find this use patronising. With adults, a more direct discussion about the possibility of them not taking full credit for their achievements and how important it is to do so is more appropriate. It used to address the individual's problems (fear/worry, fear of pain, fear of betrayal or lack of trust, poor self-esteem, and few positive coping strategies) that should have been identified during history taking, the result is a far more accurate understanding of the patient's perceptions by the dentist. In addition, the patient should feel better understood, less vulnerable and more cared for.

Williamson A and Hoggart B in (2005)[25] concluded that Pain rating scales have a fundamental place in clinical practice. The evidence suggested that patients were able to use them to communicate their pain experience and their response to treatment. The interpretation of pain scores is not straightforward. The key to successful pain management hinges upon the ability of the patient to use the tools made available, and the careful interpretation of the scores by the health care professionals. Pain intensity is probably the easiest dimension of pain to assess, but it is not so easy to interpret the intricacies of the results. Patients communicate far more information about their pain than just intensity when using a pain rating scale. Pain is entirely subjective and its links with pathology are indirect, the only way to successfully assess pain is to believe the patient. Pain is what the patient says it is. For general purposes, the Numerical Rating Scale (NRS) has good sensitivity and generates data that can be statistically analyzed for audit purposes. Patients who seek a sensitive pain-rating scale would probably choose this one. For simplicity, patients

prefer the Verbal Rating Scale (VRS), but it lacks sensitivity and the data it produces can be misunderstood.

Breivik H, Borchgrevink PC, Allen SM, Rosseland LA, Romundstad L, Breivik Hals EK et al in (2008)[29] said that valid and reliable assessment of pain is essential for both clinical trials and effective pain management. The nature of pain makes objective measurement impossible. Acute pain can be easily assessed, both at steady (important for comfort) and dynamic (important for function and risk of postoperative complications), with one-dimensional tools such as Numeric Rating Scales or Visual Analogue Scales. Both scales are more powerful in detecting changes in pain intensity than a Verbal Categorical Rating Scale. In acute pain trials, assessment of simple pain must ensure sufficient pain intensity for the trial to detect meaningful treatment effects. Chronic pain assessment and its impact on physical, emotional, and social functions require multidimensional qualitative tools and health-related quality of life instruments. The proper assessment of pain using validated tools appropriate to the population or person is an essential prerequisite of successful pain management. This is especially true for patients with acute pain after surgery, trauma, and in the intensive care unit.

Ferreira-Valente MA, Pais-Ribeiro JL and Jensen MP in (2011)[33] compared the relative validity of Visual Analog Scale (VAS), Numerical Rating Scale (NRS), Verbal Rating Scale (VRS), and Faces Pain Scale (FPS) for detecting differences in painful stimulus intensity and differences between men and women in response to experimentally induced pain. Previous studies supported the validity of each scale and findings in this study was consistent.

Nattapong Sirintawat et al in (2007)[27] said that Pain that occurs during or post-OMFS can be difficult to assess. Since patient self-reports are accepted as the gold standard for pain assessment. The tools should be simple and straight-forward to use. These tools should ideally measure baseline discomfort and the response to remedy. Several previous articles in biomedical studies suggested the use of multidimensional scales to assess chronic pain, such as in cancer and lower back pain. Several previous articles suggested the use of unidimensional scales to measure acute pain caused by trauma, surgery, childbirth, or an acute medical disease. Previous articles used the VAS in acute pain for pain assessment. The full cup test is useful for pain assessment with low-educated patients because it does not need any numerical or verbal skills and is easy to understand and complete the scale. Previous studies suggest the use of FPS for children and older people. The FPS is self-reporting scale that uses facial expressions to assess pain intensity. The aim of the article was to review pain intensity scales that are commonly used in dental and Oral and Maxillofacial Surgery (OMFS). In previous studies it was proven that multidimensional scales, such as the McGill Pain Questionnaire, short form of the McGill Pain Questionnaire, and Wisconsin Brief Pain Questionnaire were suitable for assessing chronic pain, while unidimensional scales, like the Visual Analog Scale (VAS), Verbal Descriptor Scale, Verbal Rating Scale (VRS), Numerical Rating Scale (NRS), Faces Pain Scale (FPS), Wong-Baker Faces Pain Rating Scale (WBS), and Full Cup Test (FCT) were used to evaluate acute pain. The Wong-Baker Faces Pain Rating Scale (WBS) is widely used to assess pain in children and the elderly because other scales are often difficult to understand, which could consequently lead to an overestimation of the pain intensity. In dental or Oral and Maxillofacial Surgery

(OMFS) research, the use of Visual Analog Scale (VAS) is more common because it is more reliable, valid, sensitive, and appropriate. However, some researchers use Numerical Rating Scale (NRS) to evaluate Oral and Maxillofacial Surgery (OMFS) pain in adults because this scale is easier to use than Visual Analog Scale (VAS) and yields relatively similar pain scores. This review only assessed pain scales used for post-operative Oral and Maxillofacial Surgery (OMFS) or dental pain.

Ergün U, Say B, Ozer G, Yildirim O, Kocatürk O, Konar D et al in (2007)[2] they develop the Full Cup Test (FCT) which is equally reliable and valid as of most accepted scales available Visual Analog Scale (VAS), Verbal Rating Scale (VRS), Numeric Rating Scale (NRS) and in this study, they showed that Full Cup Test (FCT) is more valid in the low educated patient. And he reached the conclusion that the Full Cup Test (FCT) requires further studies for validation and reliability.

The sample size could be considered as the limitations of this study, it would need a larger study to validate the above findings.

Full Cup Test (FCT) can be used for the assessment of pain after surgical removal of the third molar.

Summary and Conclusion

Third molar surgery is one of the most common procedures that is performed by Oral and Maxillofacial Surgeons worldwide. Pain, swelling, trismus are the most common sequelae following surgical removal of the third molar[6].

Pain that makes patients seek dental treatment mostly results in many different conditions and diseases of the dental, oral, facial origin or related to nearby structures. Dental – related pain may also occur after treatment done by a clinician such as extraction of teeth. Therefore, surgeon should be able to evaluate the source and nature of the pain and he must be familiar with strategies for the treatment of dental, oral, facial and post-operative pain[44].

This Descriptive Observational study was carried out on 60 patients reported to the Department of Oral and Maxillofacial Surgery for the surgical removal of third molar procedure under inclusion criteria, over the period of 18 months where same

treatment is given to all the patients and their post-operative pain was measured by three different pain measurement tools to evaluate the validity of Full Cup Test (FCT) amongst Visual Analog Scale (VAS) and Verbal Rating Scale (VRS).

As in various studies it is shown that measurement of pain is difficult and with the help of different types of pain scales the measurement of pain is done and as Numerical Rating Scale (NRS), Visual Analog Scale (VAS) and Verbal Rating Scale (VRS) are primarily used and as their disadvantages were noticed the new scale were develop to minimize the errors and overcome the disadvantages. The new scale Full Cup Test (FCT) was introduced in 2007 and a trial study was done on this scale to compare it with the accepted scale Visual Analog Scale (VAS). After that Full Cup Test (FCT) was used in low educated patients as it is easily understandable.

In this study all the data statistically showed that on comparison of correlation among Full Cup test (FCT), Visual Analog Scale (VAS) and Verbal Rating Scale (VRS) in relation to measurements of 1-hour postoperative pain after surgical extraction of third molar using Pearson 'r' correlation test, strong highly statistical significant ($p<0.001$) correlation exists between three measurement tools. In postoperative period 1, 6 and 24 hours and there was no statistically significant ($p>0.05$) difference found for subjective preference for any of the three types of the pain scale. And most low education category subjects prefer the Full Cup Test (FCT) scale (48.1%). Highly educated category subjects equally prefer all three scales.

So, it can be concluded that the Full Cup Test (FCT) for measurement of pain after surgical removal of the impacted third molar is equally valid as of the Visual

Analog Scale (VAS) and Verbal Rating Scale (VRS) as in results they all are highly significant. And Full Cup Test (FCT) is more preferred by low educated patients.

The sample size could be considered as the limitations of this study, it would need a larger study to validate the above findings.

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Annexure- I

DEPARTMENT OF ORAL & MAXILLOFACIAL SURGERY

CASE HISTORY PROFORMA

Case number-

Date-

Name-

Age/Sex-

Registration No-

Address-

Education-

Occupation-

Chief Complaint-

History of present illness –

Cause of tooth extraction-

Past Medical History-

Past Dental History-

Drug Allergy History-

Family History-

Personal History-

- Diet
- Habits

Examination-

Extraoral examination:

- Facial Symmetry
- TMJ
- Lymph nodes

Intraoral Examination**:**

- Teeth present
- Missing teeth
- Root piece
- Occlusion
- Caries/attrition/abrasion/erosion/abfraction
- Mobility
- Others

Diagnosis-

Radiographic investigations: IOPA-

OPG-

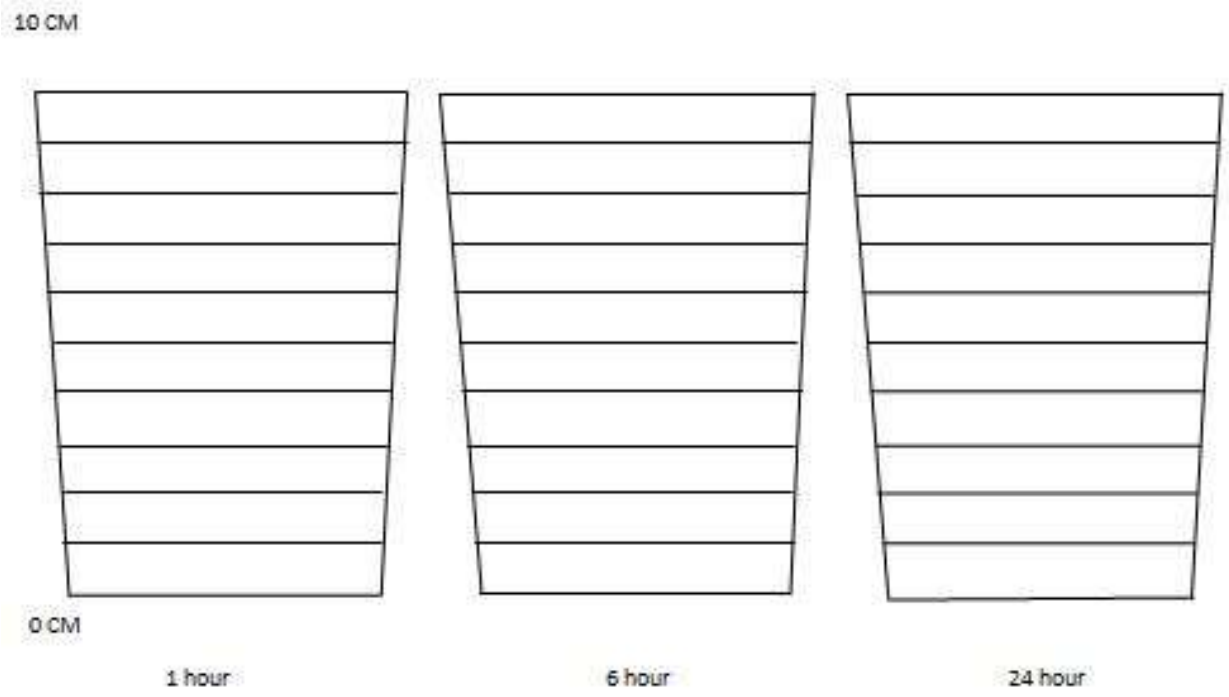
Other investigations-

Advice-

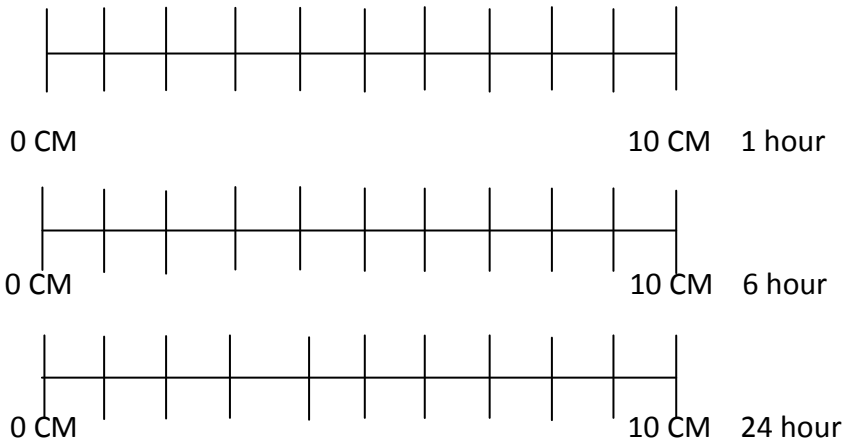
Annexure-II –

Assessment Form

FULL CUP TEST (FCT)



VISUAL ANALOG SCALE (VAS)



VERBAL RATING SCALE (VRS)

1 hour

- 0 – NO PAIN
- 1 – MILD PAIN
- 2 – MODERATE PAIN
- 3 – SEVERE PAIN

6 hour

- 0 – NO PAIN
- 1 – MILD PAIN
- 2 – MODERATE PAIN
- 3 – SEVERE PAIN

24 hour

- 0 – NO PAIN
- 1 – MILD PAIN
- 2 – MODERATE PAIN
- 3 – SEVERE PAIN

- WHICH SCALE DID YOU FIND EASY AND WHY -

Annexure- III

DEPARTMENT OF ORAL & MAXILLOFACIAL SURGERY

INFORMED CONSENT FORM

(Confidential)

" TO EVALUATE THE VALIDITY OF FULL CUP TEST FOR PAIN ASSESSMENT AGAINST VISUAL ANALOG SCALE AND VERBAL RATING SCALE AFTER SURGICAL REMOVAL OF IMPACTED THIRD MOLAR - DESCRIPTIVE OBSERVATIONAL STUDY."

I _____resident of

_____Age/ Years.

Exercising my free will, without any pressure/lure of incentive in any form, hereby give my consent to be included as subject in the said clinical study. The doctor has informed me about this research project suitably and sufficiently to my satisfaction. I agree to allow my photographs to be drawn as required. I agree to take part in this project and will not mix any other projects during the period of this trial. I shall report to the dental hospital or other place where called on given appointment dates and time. I shall inform the doctor on any adverse effect or unusual symptom noticed by me. I shall co-operate with the doctors in all respects. I permit publishing the results of my participation in this study. I shall not be given any reimbursement or compensation. I have been informed about my right to withdraw from the research project at any given time.

I hereby record my consent for participation in the said trial.

1. _____	_____	_____	_____
Patient's name	Signature	Date	Time
2. _____	_____	_____	_____
Witness name	Signature	Date	Time
3._____	_____	_____	_____
Investigator's name	Signature	Date	Time

MASTER CHART

SR.NO.	AGE	GENDER	EDUCATION	FCT			VAS			VRS			QUESTION	
				1 HOUR	6 HOUR	24 HOURS	1 HOUR	6 HOUR	24 HOURS	1 HOUR	6 HOUR	24 HOURS	WHICH	WHY
1	29	F	B	3	8	4	4	9	2	1	3	2	VAS	Simple
2	42	M	A	1	5	3	2	5	2	1	2	1	FCT	Easy
3	36	M	A	7	10	5	6	9	4	1	3	2	FCT	Good
4	28	F	B	5	4	2	7	5	4	2	1	0	VRS	Simple
5	48	M	A	2	7	4	3	7	3	1	2	1	FCT	Easy
6	32	M	B	8	6	5	7	5	5	3	2	1	VAS	Easy
7	34	F	B	3	9	5	2	8	5	0	3	1	VRS	Easy
8	38	M	B	4	10	7	3	9	6	2	3	2	VRS	Simple
9	26	F	B	3	7	2	3	5	1	0	2	1	FCT	Simple
10	37	F	A	1	6	7	2	6	8	0	2	3	VRS	Simple
11	28	M	A	6	8	4	5	8	4	2	3	2	VAS	Good
12	27	F	B	3	5	4	2	5	3	1	2	1	FCT	Good
13	31	M	A	4	8	4	4	9	5	1	3	2	VRS	Good
14	33	M	B	1	0	0	0	0	0	0	0	0	FCT	Understanding
15	27	M	A	2	5	2	3	7	4	1	2	1	VAS	Good
16	34	M	B	5	10	4	4	10	4	2	3	2	VRS	Easy
17	26	F	A	4	9	5	3	9	5	1	3	1	VRS	Easy
18	45	M	A	3	8	4	2	6	4	1	2	1	FCT	Easy
19	33	F	A	3	7	0	3	6	0	1	2	0	VAS	Simple
20	35	M	A	0	10	6	0	10	5	0	3	2	VRS	Simple
21	38	F	B	0	3	1	0	2	0	0	1	0	VRS	Easy
22	38	M	A	6	10	4	6	9	5	2	3	1	VRS	Easy
23	43	M	A	5	6	4	6	6	4	3	3	1	FCT	Easy
24	34	M	B	2	5	1	3	5	2	1	2	1	VAS	Simple
25	41	F	A	7	10	5	6	10	6	2	3	2	VAS	Simple
26	34	M	A	5	9	3	6	10	3	2	3	1	FCT	Easy
27	32	M	A	4	8	6	4	9	3	2	3	1	FCT	Easy
28	42	F	B	3	5	3	2	3	2	1	2	1	VRS	Good
29	25	M	A	6	10	5	5	9	5	2	3	2	VAS	Simple
30	34	M	A	2	3	1	3	3	1	1	1	0	VRS	Good

31	34	M	B	6	5	4	5	5	4	2	2	1	VRS	Good
32	39	M	A	5	6	4	4	6	4	2	2	2	FCT	Easy
33	48	M	A	3	2	1	3	3	1	1	1	1	FCT	Easy
34	46	M	B	9	5	8	8	6	7	3	2	3	VRS	Easy
35	44	F	A	8	8	3	9	8	4	3	3	2	VRS	Easy
36	45	M	B	5	6	8	4	6	8	1	2	3	VAS	Easy
37	49	F	B	4	5	4	4	5	4	2	2	2	FCT	Good
38	43	M	B	3	2	2	3	1	1	1	0	0	FCT	Good
39	37	M	B	7	8	7	6	8	5	3	3	2	FCT	Good
40	29	F	B	5	5	4	4	4	4	2	2	2	VAS	Simple
41	31	F	B	8	7	7	9	9	7	3	3	2	VRS	Simple
42	34	M	B	6	6	5	7	6	4	2	2	1	VAS	Easy
43	39	M	B	7	9	2	6	10	2	2	3	1	FCT	Good
44	45	M	A	5	2	1	4	2	0	2	1	0	FCT	Easy
45	53	M	A	3	8	2	2	8	1	1	3	1	VRS	Simple
46	29	F	B	6	6	2	5	5	2	2	2	1	VRS	Easy
47	30	F	B	3	9	4	2	8	4	1	3	2	VAS	Good
48	42	M	B	2	5	2	1	6	2	1	2	1	VRS	Easy
49	47	M	B	5	5	2	4	5	1	2	2	1	VRS	Simple
50	37	M	B	3	8	1	2	9	0	1	3	0	FCT	Simple
51	40	M	A	4	6	4	3	6	4	1	2	1	VRS	Simple
52	35	F	B	5	6	2	4	5	0	1	2	0	VAS	Easy
53	36	M	A	9	10	1	10	10	1	3	3	1	FCT	Easy
54	28	M	B	6	4	1	7	5	1	3	2	1	VAS	Good
55	32	F	A	2	9	1	3	8	1	1	3	1	FCT	Easy
56	45	F	B	4	5	2	3	6	2	2	2	1	FCT	Good
57	52	M	B	5	5	0	5	5	0	2	2	0	VAS	Simple
58	43	M	A	2	6	3	3	7	2	1	3	1	FCT	Easy
59	48	M	B	2	3	2	2	3	2	1	1	1	VAS	Good
60	34	M	B	4	6	3	3	5	2	2	3	1	FCT	Simple