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A comparison of paracetamol, ibuprofen or their combination for pain relief following extractions in children under general anaesthesia: a randomized controlled trial

GIATH GAZAL & IAIN C. MACKIE

Unit of Paediatric Dentistry, School of Dentistry, University of Manchester, Manchester, UK

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Objective. This study was designed to compare the effectiveness of different oral analgesics for relieving pain and distress in children following the extraction of teeth under general anaesthesia (GA). The analgesics included paracetamol alone, ibuprofen alone, and paracetamol and ibuprofen in combination.

Methods. Two hundred and one subjects were randomly allocated to one of four groups. Forty-seven children were included in the ibuprofen alone (5 mg kg^{-1}) group, 51 in the paracetamol/ibuprofen combination (15/5 mg kg^{-1}) group, 48 in the high-dose paracetamol (20 mg kg^{-1}) group, and 55 children were included in the usual-dose paracetamol (15 mg kg^{-1}) group (control group). Evaluation of distress for children was made immediately pre-operatively, on recovery from anaesthesia and again after 15 min by using a five-point face scale. Furthermore, each child was observed immediately postoperatively and 15 min postoperatively for signs of pain using the Children's Hospital of Eastern Ontario Pain Scale.

Results. There were significant decreases in the mean pain and distress scores for both the ibuprofen alone and paracetamol/ibuprofen combination groups compared to the control group (usual-dose paracetamol) at 15 min postoperatively.

Conclusions. This study provides evidence to support the oral administration of ibuprofen alone or in combination with paracetamol for postoperative analgesia in children who are having teeth extracted under GA.

Introduction

Pain management is an important part of dentistry, and paediatric dentistry in particular[1] since it has been reported in 32–70% of children following dental extractions under general anaesthesia (GA)[2]. Pain is a common cause of distress in children, and management of this pain has been subject to increasing interest during the past decade, but is still recognized as frequently being suboptimal[3,4].

Effective pain management strategies need to be developed for children having dental extractions under GA[2].

Various techniques have been tried to reduce the pain in children following extraction of their teeth, but none have been very effective. These include the use of EMLA Cream (AstraZeneca PLC, London, UK), local anaesthetic infiltration and nerve blockade[5]. Local anaesthetic infiltration in children is time-consuming. Moreover, it can lead to a feeling of numbness of the lips and gums, which children may find distressing[6,7].

A study by Gazal *et al.*[8] reported that topical anaesthetic (0.25% bupivacaine) placed over the socket at the time of extraction did not relieve children's distress on recovery from the general anaesthetic. The above authors suggested that pre-operative administration of oral analgesics may lessen postextraction pain.

A variety of analgesics have been tried in adults. For example, ibuprofen has been proven to be safe and effective in the relief of postoperative dental pain in adults[9]. A few studies have evaluated the use of pre-operative analgesics in children. Primosch *et al.*[4] found that there was no significant decrease in post-extraction pain between children in placebo

Correspondence to:
Professor I. C. Mackie, Professor of Dental Education and Honorary Consultant Paediatric Dentistry, School of Dentistry, University of Manchester, Higher Cambridge Street, Manchester M15 6FH, UK. E-mail: Iain.Mackie@manchester.ac.uk

and paracetamol groups. Primosch *et al.*[9] conducted a study of 60 children to evaluate the efficacy of the pre-operative administration of ibuprofen and paracetamol compared with a placebo for pain relief after teeth extractions. They found that the pre-operative administration of neither analgesic was superior to placebo administration. A study by Pickering *et al.*[10], however, provided evidence to support the combination of ibuprofen with paracetamol for peri-operative analgesia in children after tonsillectomy. McGaw *et al.*[11] found ibuprofen to be more efficacious than paracetamol or placebo for postoperative pain in children undergoing permanent tooth extraction. Perrott *et al.*[12] summarized studies testing the efficacy and safety of single-dose paracetamol and ibuprofen for treating children's pain or fever. They found that single doses of ibuprofen (4–10 mg kg^{-1}) and paracetamol (7–15 mg kg^{-1}) have similar efficacy for relieving moderate to severe pain.

This study was designed as a randomized controlled clinical trial using reliable pain and distress assessment methods together with different types and doses of oral analgesics. Based on the experiences gained from a previous study by Gazal *et al.*[8], the work by Katz *et al.*[13] and a pilot using a visual analogue scale on 25 older children, observational measures of distress and pain were chosen because they were unobtrusive, did not require training in interpretation of data and did not rely on the varying ability of the subject to self-report. The observation scale of behavioural distress (smiling faces), as described by Maunuksela *et al.*[14], was chosen to assess distress. This is very easy to use and gives very consistent scores in a range from 0 to 4. The Children's Hospital of Eastern Ontario Pain Scale (CHEOPS) was also chosen because it is well established with documented validity and reliability for the assessment of postoperative pain[15–18].

The aims of this study were: to reduce the levels of dental pain and distress in children following the extraction of teeth under GA by administering a pre-operative oral dose of paracetamol alone, ibuprofen alone and paracetamol/ibuprofen combination. Further aims were to evaluate the relationship between the upset parent and distressed child, and to assess the effect of age, gender and the number of teeth extracted on pain and distress.

Table 1. Description of the number of teeth extracted and the ages of the children in the study: (SD) standard deviation.

Treatment group	Number of children	Range	Mean ± SD
Number of teeth extracted			
Usual-dose paracetamol	55	1–14	6 ± 3.01
Ibuprofen	47	1–12	7 ± 3.03
Usual-dose paracetamol	55	1–14	6 ± 3.01
Paracetamol/ibuprofen	51	1–12	7 ± 3.13
Usual-dose paracetamol	55	1–14	6 ± 3.01
High-dose paracetamol	48	1–12	7 ± 2.88
Age in years			
Usual-dose paracetamol	55	2–12	6.5 ± 2.63
Ibuprofen	47	3–13	7.0 ± 2.55
Usual-dose paracetamol	55	2–12	6.5 ± 2.63
Paracetamol/ibuprofen	51	2–11	6.2 ± 2.42
Usual-dose paracetamol	55	2–12	6.5 ± 2.63
High-dose paracetamol	48	3–12	6.9 ± 2.20

Subjects and methods

The study was approved by the Central Manchester Local Research Ethics Committee, Manchester, UK. After written informed parental consent and verbal agreement from the subjects had been obtained, 212 children who attended the paediatric dentistry unit in a dental hospital, ASA I or II, aged 2–12 years, and presenting for elective teeth extractions of between one and 14 teeth, were entered into the trial (Table 1). Using computer-generated random numbers, slips of paper were labelled as normal-dose paracetamol, ibuprofen, paracetamol/ibuprofen combination or high-dose paracetamol, and placed in sequentially numbered envelopes. This was done by a secretary who was not associated with the study. After all screening procedures had been completed and the eligibility of the patient has been confirmed, the child was allocated the next numbered envelope, this was opened by a dentist not associated with the study and the named analgesic on the slip of paper was given to the child. The slip was placed back into the envelope, which was put back into the patient's records. This ensured that both the patients and investigator were blinded to the study group assignment. The exclusion criteria were

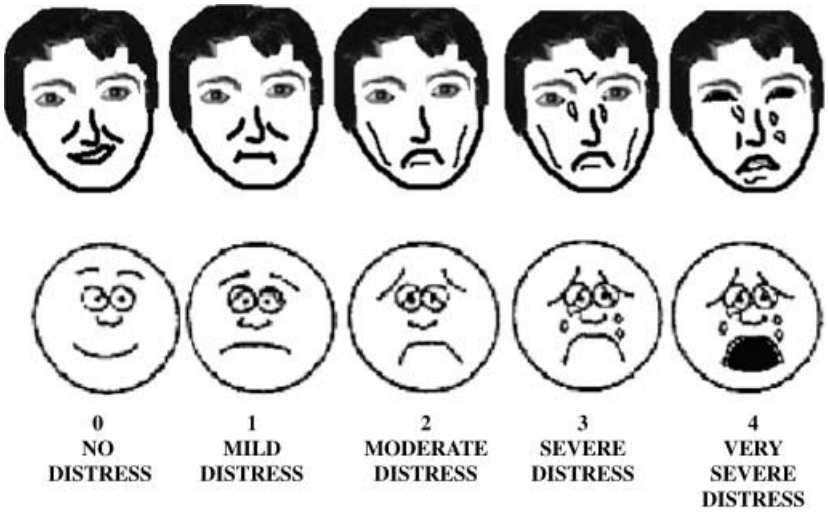

Fig. 1. Five-face scales used to assess distress in children and adults.

sensitivity to ibuprofen and paracetamol, asthma, refusing the pre-operative dose of oral paracetamol or ibuprofen, parents who were too distressed or upset to be approached, and children who were unwilling to take part.

The children were premedicated at least 1 h before having the general anaesthetic and extractions with a pre-operative elixir which was either normal-dose paracetamol (15 mg kg^{-1}), paracetamol/ibuprofen combination (15/5 mg kg^{-1}), ibuprofen alone (5 mg kg^{-1}) or high-dose paracetamol (20 mg kg^{-1}). The paracetamol and ibuprofen doses used for this study were set at such a level as to keep the side-effects to a minimum[19–21]. The appropriate dose was given based on the child's weight. All patients received topical anaesthetic EMLA Cream, applied to both hands at least 1 h before induction. This is the usual clinical practice. General anaesthesia was administered in an outpatient theatre with an associated recovery room. Intravenous induction with proprofol and inhalational maintenance with nitrous oxide, oxygen and a volatile agent such as enflurane was the usual anaesthetic method. On occasions when intravenous access was difficult, inhalational induction with sevoflorane was used. The airway was maintained using laryngeal mask airways. Standard extraction techniques using elevators and dental forceps were employed. In theatre, once the extractions had been completed and whilst the child was still anaesthetized on the trolley, one long swab was placed over the sockets in the child's mouth. The trolley with the patient was then wheeled through into the adjacent recovery room. As the child began to recover from the anaesthetic, the swab was removed from the child's mouth. The children were cared for in the recovery area by nurses and accompanied by their parents until they were assessed as being fit enough to be discharged home by the anaesthetist.

Each child and their parent were observed for signs of distress, and these observations were recorded using the smiling faces scale (Fig. 1). The scores given were: (0) no sign of distress; (1) mild distress; (2) moderate distress; (3) severe distress; or (4) very severe distress. Evaluation of distress was made pre-operatively when children entered the operating theatre and before the induction of GA, on recovery from anaesthesia when the patient was sitting up and talking, and again after 15 min. Each child was also observed for signs of pain by using CHEOPS. Scores of 4–13 include the following areas: crying, facial expression, verbal statements, position of torso, touching of wound and movement of legs (Fig. 2). These observations were made on recovery from anaesthesia and again after 15 min. The one researcher who made all the observations of pain and distress was trained and completely independent of the whole process.

Statistical analysis

Sample size calculations were made for this study based on work by Gazal *et al.*[8] A sample size of 47 in each group would have 90%

ITEM	BEHAVIOUR	SCORE
Cry	No cry	1
	Moaning	2
	Crying	2
	Scream	3
Facial	Smiling	0
	Composed	1
	Grimace	2
Child verbal	Positive	0
	Non	1
	Other complaints	1
	Pain complaints	2
	Both complaints	2
Torso	Neutral	1
	Shifting	2
	Tense	2
	Shivering	2
	Upright	2
	Restrained	2
Touch	Not touching	1
	Reach	2
	Touch	2
	Grab	2
	Restrained	2
Legs	Neutral	1
	Squirming/kicking	2
	Drawn up/tensed	2
	Standing	2
	Restrained	2

Fig. 2. Children's Hospital of Eastern Ontario Pain Scale used to assess pain in children.

power to detect a difference in means of 0.880 for both the pain and distress scores [the difference between the paracetamol (control) group mean of 1.28 and a test group mean of 0.40], assuming that the common standard deviation is 1.30 using a two group *t*-test with a 0.05 two-sided significance level. In this study, 3% of children allocated to treatment groups were lost to follow-up, and therefore, a total sample size of at least 194 children was recruited for this study.

All data were entered into a computerized data base file by a clerk not associated with the study. The statistical analysis was carried out using a computer software package, SPSS for Windows (SPSS Inc., Chicago, IL, USA), and appropriate statistical tests were used. Independent samples *t*-test, one-way analysis of variance (ANOVA) and paired-sample *t*-test statistics were used for distress and pain scores measured pre-operatively, postoperatively and 15 min postoperatively. Correlation coefficients were calculated to evaluate the relationship between parent and child distress.

Results

Of the 212 subjects recruited, 11 children were excluded by the anaesthetists because they were considered unsuitable for the outpatient GA on the day (five children had an undiagnosed heart condition, three had a cold with blocked nose and difficulty in breathing, one was overweight and two children were extremely scared). These subjects included three children in the normal-dose paracetamol group, three in the ibuprofen alone group, two in the paracetamol/ibuprofen combination group and three in the high-dose paracetamol group. Therefore, the final sample size comprised 201 children, with 55 in the normal-dose paracetamol (control), 47 in the ibuprofen alone, 51 in the paracetamol/ibuprofen combination and 48 in the high-dose paracetamol groups. It was considered appropriate to use parametric tests to analyse the data because of the distribution of the data and the large numbers in each group. The baseline characteristics among these four groups were generally similar with respect to the following parameters: sex, age, weight, number of extractions and time from having the analgesic to having teeth extracted. There was no significant statistical difference on any of the assessment parameters between any of the four groups.

The numbers of teeth extracted and the ages of the children are given in Table 1. The mean number of teeth extracted per child was six, and the mean age was 7 years.

The overall outcome of the pain scores of the 201 children who participated in the study are summarized in Table 2. These scores were obtained by using CHEOPS. The scores were rated from a score of 4, representing 'no pain', to a score of 13, representing 'very severe pain', with the intermediate scores representing different levels of pain. There were no statistically significant differences between the mean pain scores for the ibuprofen alone, paracetamol/ibuprofen combination, high-dose paracetamol and control (normal-dose paracetamol) groups postoperatively (*P*-values from one-way ANOVA = 1.00). For both the ibuprofen alone and paracetamol/ibuprofen combination groups, however, there were statistically significant decreases in mean pain scores at 15 min

Table 2. Summary of the outcomes of pain scores for the children in the usual-dose paracetamol, ibuprofen alone, paracetamol/ibuprofen combination and high-dose paracetamol groups postoperatively and 15 min postoperatively (total *n* = 201).

	Treatment group (*n*)			
Pain score	**Usual-dose paracetamol**	**Ibuprofen alone**	**Paracetamol/ ibuprofen**	**High-dose paracetamol**
15 min postoperatively				
4	7	10	14	6
5	9	11	15	6
6	4	9	3	8
7	6	4	4	4
8	6	4	3	5
9	3	1	4	5
10	4	4	1	3
11	5	2	2	5
12	5	0	3	4
13	6	2	2	2
Total	55	47	51	48
Postoperative assessment				
4	5	2	1	3
5	4	6	5	1
6	6	14	14	7
7	10	4	4	8
8	5	6	5	6
9	8	4	9	10
10	5	4	8	3
11	6	6	1	7
12	6	1	2	2
13	0	0	2	1
Total	55	47	51	48

Table 3. Comparisons between mean pain scores for the ibuprofen alone, paracetamol/ibuprofen combination, high-dose paracetamol and usual-dose paracetamol groups 15 min postoperatively: (SD) standard deviation.

Treatment group	**Number of children**	**Mean (± SD)**	***F*-value (d.f. = 197)**	***P*-value**
Usual-dose paracetamol	55	8.13 ± 3.07	4.79	0.023
Ibuprofen	47	6.51 ± 2.47		
Usual-dose paracetamol	55	8.13 ± 3.07	4.79	0.017
Paracetamol/ibuprofen	51	6.49 ± 2.77		
Usual-dose paracetamol	55	8.13 ± 3.07	4.79	1.00
High-dose paracetamol	48	7.79 ± 2.87		

postoperatively compared with the control group (normal-dose paracetamol) (*P*-values from one-way ANOVA = 0.023, 0.017; Table 3).

The distress scores were obtained by using the smiling faces scale and rated from (0) 'no distress' to (4) 'very severe distress', with the intermediate scores representing mild, moderate and severe distress. There were no statistically significant differences between the mean distress scores for the paracetamol/ibuprofen combination, high-dose paracetamol and control (normal-dose paracetamol) groups pre-operatively (*P*-values from one-way ANOVA = 0.10, 0.25). For the ibuprofen only group, however, there was a significant decrease in mean distress scores pre-operatively compared to the control group (normal-dose paracetamol) (*P*-values from one-way ANOVA = 0.005). It was also found that, postoperatively, there were no statistically significant differences between the mean distress scores for the paracetamol/ibuprofen combination, high-dose paracetamol and control (normal-dose paracetamol) groups pre-operatively (*P*-values = 1.00, 1.00, 1.00). At 15 min postoperatively, there were no statistically significant differences between the mean distress scores for the high-dose paracetamol and control (normal-dose paracetamol) groups (*P*-values from one-way ANOVA = 1.00). For both the ibuprofen alone and paracetamol/

Table 4. Comparisons between mean pre-operative distress scores and postoperative or 15 min postoperative for children in the ibuprofen alone, paracetamol/ibuprofen combination, high dose paracetamol and normal-dose paracetamol groups: (SD) standard deviation.

Treatment group	Mean (± SD)	Paired *t*-value (d.f.)	*P*-value
Usual-dose paracetamol:			
pre-operative	1.93 ± 1.63	0.503 (54)	0.617
postoperative	2.07 ± 1.40		
pre-operative	1.93 ± 1.63	0.453 (54)	0.653
15 min postoperative	2.07 ± 1.49		
Ibuprofen:			
pre-operative	0.94 ± 1.22	3.60 (46)	0.001
postoperative	1.77 ± 1.13		
pre-operative	0.94 ± 1.22	1.61 (46)	0.114
15 min postoperative	1.28 ± 1.17		
Paracetamol/ibuprofen:			
pre-operative	1.24 ± 1.42	2.05 (50)	0.045
postoperative	1.76 ± 1.12		
pre-operative	1.24 ± 1.42	0.528 (50)	0.600
15 min postoperative	1.37 ± 1.18		
High-dose paracetamol:			
pre-operative	1.33 ± 1.53	2.98 (47)	0.005
postoperative	2.00 ± 1.15		
pre-operative	1.33 ± 1.53	1.70 (47)	0.096
15 min postoperative	1.81 ± 1.32		

ibuprofen combination groups, however, there were significant decreases in mean distress scores compared to the control group (normal-dose paracetamol) (*P*-values from one-way ANOVA = 0.014, 0.037).

For all groups, i.e. ibuprofen alone, paracetamol/ibuprofen combination, high-dose paracetamol and control (normal-dose paracetamol), changes in distress scores from the pre-operative score to the postoperative and 15 min post-operative scores were made using the paired sample *t*-test. There were generalized increases in mean distress scores for all groups when comparing the pre-operative score with the postoperative one. Statistically, the increase was significant in the ibuprofen alone, paracetamol/ibuprofen combination and high-dose paracetamol groups (*P*-values = 0.001, 0.045, 0.005, Table 4).

There was low correlation between the child and parent distress scores given by the independent assessor pre-operatively, postoperatively and 15 min postoperatively. The correlation coefficients were, respectively, 0.30, 0.33 and 0.47 for the distress scores ($P < 0.001$).

Table 5. Comparisons between mean pain and distress scores pre-operatively, postoperatively and 15 min postoperatively for subjects aged 2–7 and 8–12 years.

Age group (years)	Number of patients	Mean distress scores (± SD)	*t*-test (d.f. = 199)	*P*-value
Postoperatively:				
2–7	134	8.3 (2.28)	2.63	0.009
8–12	67	7.4 (2.22)		
15 min postoperatively:				
2–7	134	7.8 (3.00)	4.18	< 0.001
8–12	67	6.1 (2.18)		
Pre-operatively:				
2–7	134	1.3 (1.51)	–1.26	0.21
8–12	67	1.6 (1.48)		
Pre-operatively:				
2–7	134	2.1 (1.23)	2.98	0.002
8–12	67	1.6 (1.11)		
15 min postoperatively:				
2–7	134	1.9 (1.38)	3.99	< 0.001
8–12	67	1.1 (1.09)		

In order to investigate the effect of age, the children were divided into two groups by using the mean age of 7 years as a cut-off point to split the participants; therefore, the first group comprised patients who were aged between 2 and 7 years, and the second group comprised patients who were aged between 8 and 12 years. There were significant differences in the mean distress and pain scores between the two age groups ($P < 0.05$). Postoperatively, it was found that children aged between 2 and 7 years recorded higher distress and pain scores than children aged between 8 and 12 years (mean distress scores = 2.1 and 1.6, respectively; mean pain scores = 8.3 and 7.4, respectively). This was the same 15 min post-operatively (mean distress scores = 1.9 and 1.1, respectively; mean pain scores = 7.8 and 6.1, respectively) (Table 5).

There were also significant differences in the mean distress and pain scores between children who had between one and six teeth extracted compared with those who had between seven and 14 extracted ($P < 0.05$). Children who had seven or more teeth extracted recorded higher distress and pain scores than children who had fewer than seven teeth extracted. This was on two levels: postoperatively (mean distress scores = 2.1 and 1.7, respectively; mean pain scores = 8.5 and 7.4, respectively) and 15 min postoperatively (mean distress scores = 1.8 and

Table 6. Comparisons between mean pain and distress scores pre-operatively, postoperatively and 15 min postoperatively for the subjects in the two extraction groups.

Extraction group (number of teeth)	Number of patients	Mean distress scores (± SD)	*t*-test (d.f. = 199)	*P*-value
Postoperatively:				
1–6	91	7.4 ± 2.22	−3.46	0.001
7–14	110	8.5 ± 2.25		
15 min postoperatively:				
1–6	91	6.8 ± 2.79	−2.05	0.042
7–14	110	7.6 ± 2.89		
Pre-operatively:				
1–6	91	1.6 ± 1.59	1.76	0.08
7–14	110	1.2 ± 1.42		
Postoperatively:				
1–6	91	1.7 ± 1.27	−2.17	0.03
7–14	110	2.1 ± 1.14		
15 min postoperatively:				
1–6	91	1.4 ± 1.31	−2.13	0.04
7–14	110	1.8 ± 1.33		

1.4, respectively; mean pain scores = 7.8 and 6.1, respectively) (Table 6).

The mean time between administration of the pre-operative analgesic and the patient starting to recover from the general anaesthetic was 2 h, with a standard deviation (SD) of 0.64 h. For children in the ibuprofen alone, paracetamol/ibuprofen combination and high-dose paracetamol groups, the mean times (± SD) were, respectively, 2 ± 0.70, 2 ± 0.61 and 2.1 ± 0.57 h, while this was 2 ± 0.68 h for children in the normal-dose paracetamol group. The statistical one-way ANOVA test revealed that there was no significant difference between the study and control groups.

Discussion

A study by Atan *et al.*[22] revealed that pain following dental GA in children was the most prevalent and long-lasting symptom of post-operative morbidity. Thus, improvement in pain control has the potential to reduce reported morbidity following dental GA. Simple dental extractions cause pain and efficient administration of appropriate analgesia should be an integral part of any dental service[23].

Dionne[24] wrote that paracetamol and ibuprofen in combination could be a useful analgesic regimen against pain. This is supported by Pickering *et al.*[10], who found that the addition of ibuprofen to paracetamol reduced the need for early analgesia from 72% to 38% after tonsillectomy in 3–15-year-old children. It is thought that paracetamol and ibuprofen in combination exert their anti-analgesic effects through both central and peripheral mechanisms of action involving the inhibition of prostaglandin release in the central nervous system and at the site of the injured tissues[25–27].

The results of this study have produced convincing evidence that both ibuprofen and paracetamol/ibuprofen combination were effective in reducing the levels of pain and distress in children following extractions under GA. Fifteen minutes postoperatively, the children in both the ibuprofen and paracetamol/ibuprofen combination groups scored less pain and distress than those who were in the normal-dose paracetamol group.

The findings of this study also revealed that the children in the ibuprofen and paracetamol/ibuprofen groups, who showed lower levels of pain 15 min postoperatively, also showed significantly lower levels of distress.

The magnitudes of change in the pain and distress scores were relatively small. Any reduction in pain and distress that can be observed by a parent or dentist, however, must benefit children who have to have teeth extracted under GA.

Balmer *et al.*[28] carried out a study on children to examine the anxiety levels of children referred for dental GA and their parents at various key points of the referral and anaesthetic procedure. The outcomes of Balmer

et al.[28] study showed that there was a very strong correlation between pain and distress scores throughout the study, and that this did not seem to be affected by any variable. It is suggested that it may be possible to reduce the overall distress caused by the experience of a GA by reducing both the anxiety prior to the operation and the pain following the operation.

This study indicated that parental and child distress were not related, although there was a low correlation between the child and parents distress scores given by the independent assessor pre-operatively, postoperatively and 15 min postoperatively. During the study, the observer noted that there appeared to be three different groups of parents. Group 1 was distressed because of their excessive concern about the GA. These parents became less distressed or not concerned at all once they saw their children wake up. In the second group of parents, their level of distress dramatically dropped off as the distress of their children became less. There was, however, a third group of parents who showed no change in their level of distress throughout all stages of the process. This latter group of parents was not affected by the GA and extraction process, or whether or not their child was or was not in distress.

It was interesting to find in this study that pain and distress scores were influenced by the child's age at the postoperative and 15 min postoperative stages of the assessment. Children who were younger than 7 years showed higher levels of pain and distress scores compared with those who were older than 7 years in all study groups on recovery time and 15 min postoperatively. This result is consistent with the findings from the study by Gazal *et al.*[8] showing that younger children were more distressed following the extraction of teeth under GA than those who were older. Young children undergoing dental extractions may vary in their pain response because of individual differences in temperament[9].

The results of this study showed that an increased number of extractions led to increased levels of pain and distress in children following the teeth extractions postoperatively and 15 min postoperatively. Woolf[29] reported that tissue injury causes an increase in the excitability of dorsal horn neurones in the central nervous system. The increased excitability of dorsal horn neurones contributes to pain in the post-operative period[30]. The amount of inflamed substance (prostaglandin) synthesized or released in response to tissue injury could be changed by the increased size or number of surgical sites[31]. The greater the number or size of surgical sites, the greater the pain which arises[32,33]. This piece of research has brought to light other areas for further research. These include how these analgesics affect cortisone and adrenalin levels amongst those children who record high or low pain and distress scores in order to evaluate the activity of the hypothalamic pituitary–adrenal axis, reticular activation system and sympathetic nervous system following the extraction of teeth under GA. It would also be interesting to investigate how the different behaviours of different groups of parents affect their children during and after the GA and extraction experience. This could give valuable information on how parents should be prepared before the GA, so as to help their children through the whole process.

What this paper adds
- Adds to knowledge regarding pain relief in children.

Why this paper is important to paediatric dentists
- Identifies that Ibuprofen and Ibuprofen with Paracetamol is more effective at reducing post-operative pain than Paracetamol alone.

Conclusion

This study has shown that ibuprofen and ibuprofen/paracetamol combination were more effective than normal- or high-dose paracetamol at reducing children's pain and distress following extraction of teeth under GA.

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