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QUALITY OF LIFE (QOL)

FOLLOWING INTRA-ALVEOLAR OR ORAL ADMINISTRATION OF DEXAMETHASONE IN SURGICAL REMOVAL OF IMPACTED MANDIBULAR THIRD MOLAR: A RANDOMIZED CONTROLLED STUDY.

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Abstract

Surgical removal of impacted mandibular third molars (IMTMs) is a frequently performed procedure in oral and maxillofacial surgery practice. Presently, Quality of life (QoL) assessment is now regarded as an important tool for assessing clinical care outcomes. Immediate postoperative complications following surgical removal of impacted mandibular third molar such as pain, trismus, swelling and difficulty in swallowing often impact negatively on the patients' QoL, leading to loss of productivity and the global cumulative cost that runs into billions of dollars ("Economic aspects of mandibular third molar surgery," 2010).

The objective of this study was to compare the effect of oral or topical dexamethasone on quality of life following surgical removal of impacted mandibular third molars.

Ethical approval was obtained and patients 18 years and above who required surgical removal of the impacted mandibular third molar were randomly allocated into 3 groups. Group 1 received oral dexamethasone 30 minutes before surgery and then 8 hourly for 24 hours and Group 2 received intra-alveolar dexamethasone 4mg respectively, both groups also received postoperative antibiotics and analgesics. Patients in group 3 received no dexamethasone but were only given post-operative antibiotics and analgesics. All patients had preoperative evaluation of their QoL using OHIP-14 questionnaires. Data obtained was analyzed using SPSS version 25. One hundred and eighty-six patients, 71(38.2%) males and 115(61.8%) females with Mean±SD of 30.1±6.9 completed the postoperative review. The mean QoL was worst (higher scores) among the groups on postoperative day 1. Group 2 patients had the best overall QoL score on POD 7 as compared with groups 1 and 3, with statistical significance (p=0.0001).

The present study shows that intra-alveolar application of dexamethasone following the surgical removal of IMTMs showed the least deterioration in the patients' quality of life in the immediate postoperative period and particularly POD 1 and POD

Keywords: *Dexamethasone, third molar, Quality of life, Pain, Swelling, Trismus.*

Introduction

Quality of life (QoL) is a term widely used in various fields in health care, including dentistry(Sischo & Broder, 2011). Quality-of-life research in dentistry has rapidly expanded over the past few decades, with oral health-related quality of life (OHRQoL) now recognized as a key outcome measure in clinical practice and dental research.

The term QoL was originally indexed in the Index Medicus in 1975 and more than 5000 articles have been published with the concept of QoL(Colorado-Bonnin, Valmaseda-Castellón, Berini-Aytés, & Gay-Escoda, 2006). In dentistry, QoL as it relates to oral health, has only been recently employed in dental care(McGrath & Bedi, 1999). Presently, QoL assessment is now regarded as an important tool for assessing clinical care outcomes(Sischo & Broder, 2011)

Surgical removal of impacted mandibular third molars (IMTMs) is a frequently performed procedure in oral and maxillofacial surgery practice(Sifuentes-Cervantes, Carrillo-Morales, Castro-Núñez, Cunningham, & Van Sickels, 2021). As an invasive intervention, an inflammatory response of variable degree appears, which depends on factors such as the patient's individual physiological response, tissue trauma, and the degree of bone manipulation(Fernández-Martín, Lisbona-González, Vallecillo-Rivas, Mallo-Magariños, & Herrera-Briones, 2024).

Immediate postoperative complications following third molar removal such as pain, trismus, swelling and difficulty in swallowing often impact negatively on the patients' QoL, as well as making oral hygiene techniques difficult(Kiencało, Jamka-Kasprzyk, Panaś, & Wyszynska-Pawelec, 2021), thus leading to loss of productivity and the global cumulative cost that runs into billions of dollars("Economic aspects of mandibular third molar surgery," 2010): (Flick, 1999). Many studies, especially in developed countries have looked at the impact of administering systemic steroids rather than administering topical steroids in mitigating the consequences following the surgical removal of IMTMs on patients' day-to-day living(Brickley & Shepherd, 2001). A few studies have been published about the impact on QoL regarding the administration of steroids following the surgical removal of IMTMs in sub-Saharan Africa.(Brammah, Ndukwe, Owotade, & Aregbesola, 2016; Ibikunle, Adeyemo, & Ladeinde, 2016).

The aim of this study was to compare the QoL following the administration of intra-alveolar and oral dexamethasone after the surgical removal of IMTMs.

Materials and Methods

This prospective randomized controlled double-blind study was conducted at the Department of Oral and Maxillofacial Surgery of Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria between June 2020 and March 2021. The study was approved by the Health Research and Ethics Committee of Usmanu Danfodiyo University Teaching Hospital (UDUTH/HREC/2020/980/V1) and the study was

conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from each patient.

Healthy patients above 18 years and older with an impacted third molar tooth not previously treated and requiring surgical removal under local anesthesia were included. Patients were excluded if they had a severe illness, a history of an allergic reaction to steroids, patients with acute symptoms (acutely infected wisdom teeth), suppurative infections (pericoronitis, abscess), mobile teeth, specific medical contraindications to the use of steroids (gastrointestinal tract ulcer, diabetes, glaucoma, etc.) pregnant or lactating women and when on other anti-inflammatory drug therapy. QoL was assessed pre- and post-operatively using Oral health impact profile-14 (OHIP-14)(Ibikunle et al., 2016)

Subjects were randomly assigned to the three different groups using a simple randomization procedure with computer-generated allocation i.e. computer-generated random numbers were used to randomize subjects into groups 1,2, and 3. The randomization was carried out by a trained research assistant and the allocation sequence were concealed from the patient and the assessor by using sequentially numbered, opaque, sealed, and stapled envelopes.

The patients in Group 1 received 4mg oral dexamethasone, Group 2 received 4mg intra-alveolar dexamethasone and Group 3 (control group) received no dexamethasone following the surgical removal of IMTMs. One hour before the surgical procedure, each patient rinsed the mouth with 10mls of 0.12% Chlorhexidine for 1 minute. All surgical procedure were carried out under local anesthesia (2% Lignocaine hydrochloride with 1: 80,000 adrenaline) and were performed by the same surgeon under identical standardized technique and conditions according to(Hassan, 2010). All the four types of impactions (mesio-angular, disto-angular, vertical and horizontal) according to winters classification were included in this study(Santos, Lages, Maciel, Glória, & Douglas-de-Oliveira, 2022). Buccal guttering technique was used in the removing of the IMTMs and average time taken for the removal of the impacted tooth was between 15-20 mins. All patients received post-operative antibiotics and analgesics (Amoxicillin capsule 500mg, 8hourly for 5 days, Metronidazole tablet 400mg, 8hourly for 5 days after surgery, Ibuprofen tablet 400mg per oral after the surgery and then 8 hourly for 3 days) commencing 30 minutes after the surgery.

A review appointment was scheduled for postoperative days 1,3 and 7. Patients were asked to complete the questionnaire (OHIP-14)(Slade & Spencer, 1994). Oral health impact profile -14 (OHIP-14) is a standard tool used in measuring quality of life in this study. The lowest obtainable score is 14 and the highest is 56. Low scores depict good QoL while the high scores depict deteriorating or bad QoL. For OHIP-14, there are 7 domains: 1) Functional limitation, 2) Physical pain, 3) Psychological discomfort, 4) Physical disability, 5) Psychological disability, 6) Social disability, 7) Handicap. These domains have several symptoms that were assessed as shown in Appendix 1. Each item was scored: Not at all- score 1; A little- score 2; Quite a lot- score 3; Very much-

score 4. Therefore, the minimum score possible was 14, while the maximum score possible was 56. The lower the OHIP-14 score, the better the QoL, while the higher the score, the worse the QoL.

Data were analyzed using the IBM SPSS Statistics for Windows version 20.0. Armonk, NY: IBM Corp. Categorical data were presented as frequencies and percentages, while continuous variables were presented as means, standard deviation, or median depending on the normality test using the kolmogorov-Smirnov test. Analysis of variance (ANOVA) was used in the analysis of OHIP-14, pain, inter-incisal mouth opening and facial swelling. Post hoc (Tukey) test was carried out to know where the differences between the groups lie. The critical level of significance was set at $p \leq 0.05$

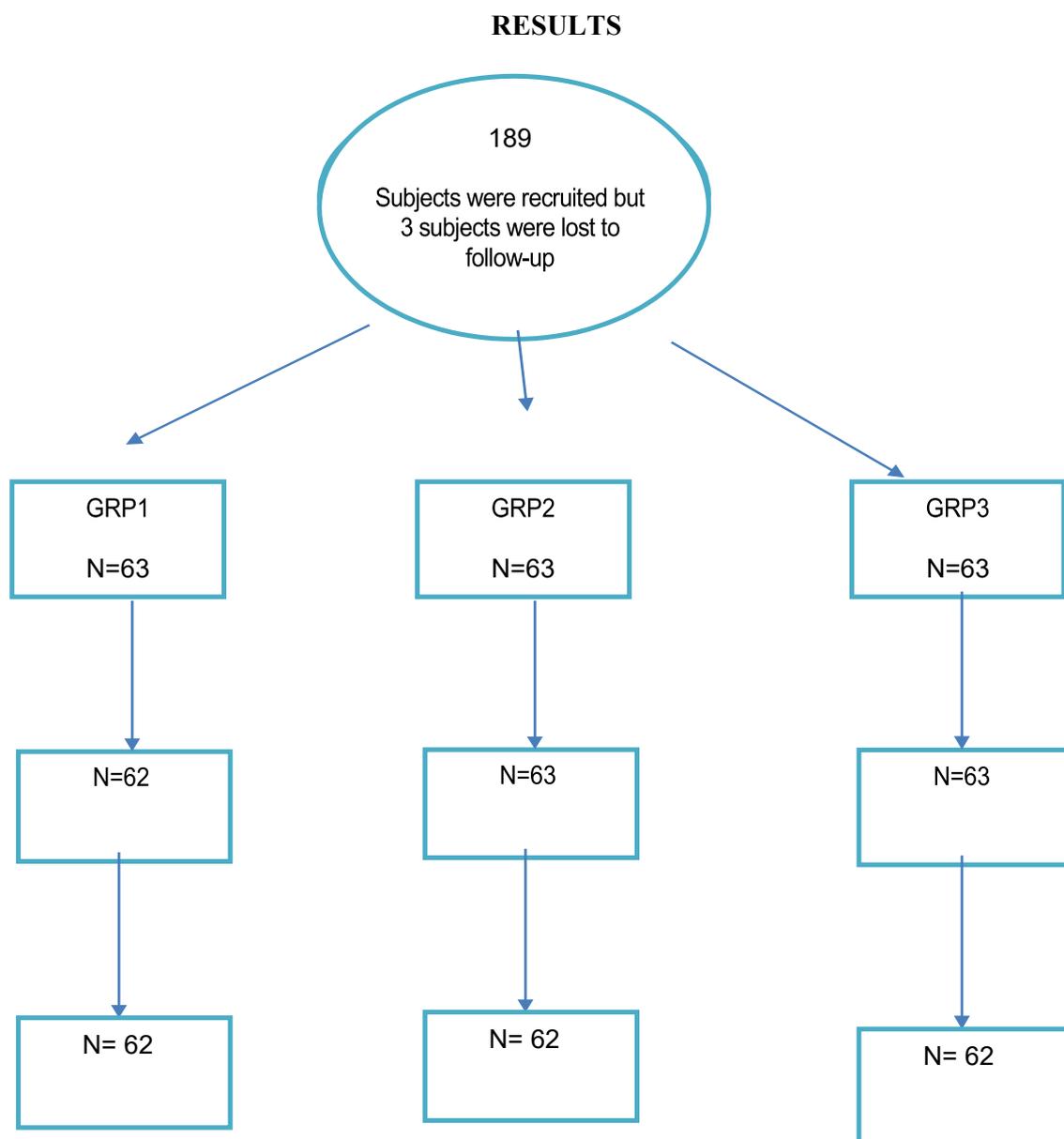


Fig 1: Patients flow chart

One hundred and eighty-six patients, (38.2. %) males and (61.8.%) females were included in the study and were evenly distributed into three groups (62 in each group).

All patients completed the postoperative review days whereby 71(38.2%) were males and 115(61.8%) were females in which case, 62 patients participated in each group. The overall male to female ratio was 1:1.61 with female preponderance in all the three groups as shown in Table 1.

The mean QoL was worst (higher scores) among the groups on postoperative day 1. These values gradually returned below the pre-operative QoL values by POD 7 in all patients except in group 3 where the mean QoL score was 28.52 ± 2.95 (range 22-37). Group 2 had the best overall QoL score (18.00 ± 1.80 , range 14-25) on POD 7 with statistical significance ($p=0.0001$) as compared with the preoperative value as shown in Table 2.

It was observed that the most affected subscales in all the three groups when compared with the pre-operative scores on POD 1 were: "Ability to chew food", "Change in Diet", "Ability to open mouth", "More interruptions in sleep". These values continue to reduce over the following POD 3 to POD 7 signifying improvements in QoL. Group 3 was mostly affected in all the subscales of the QoL scores by consistently showing higher scores as shown in Table 3.

Discussion

One hundred and eighty-six patients, 71(38.2%) males and 115(61.8%) females with Mean \pm SD of 30.1 ± 6.9 completed the postoperative review days in this study. The mean QoL was worst among the groups on postoperative day 1. Group 2 patients had the best overall QoL score on POD 7 as compared with groups 1 and 3, with statistical significance difference ($p=0.0001$).

In this study, the patient's quality of life perception was evaluated using the 14-item Oral health impact profile (OHIP-14) which was based on the World Health Organization (WHO) model of disease-impairment-disability-handicap(Zucoloto, Maroco, & Campos, 2016). It has been reported to have good reliability, validity, precision, and sensitivity(Motallebnejad, Hadian, Mehdizadeh, & Hajiahmadi, 2011). OHIP-14 has been widely used as a QoL instrument following the surgical removal of IMTMs(Motallebnejad et al., 2011)

This study demonstrated that there was a deterioration in overall mean QoL in all the study groups. However, it was worse in group 3 when compared with group 1 and group 2 on all the evaluation periods (POD 1, 3, and 7). These results are in accordance with the findings by Majid et al.(Majid & Mahmood, 2013) The main reason for this observation could be explained by the anti-inflammatory effect of dexamethasone either as an oral or topical regimen. However, these results are not in accordance with the findings by Tiwana et al. that reported no significant effect of corticosteroids on postoperative QoL following mandibular third molar removal.(Tiwana et al., 2005) Their observation could be because surgical removal was carried out under general anesthesia where most of the subscale's evaluation after surgery may be difficult to

carry out.

The findings of the present study show that the mean quality of life subscale scores in the preoperative and postoperative periods (POD 1,3, and 7) in all groups worsened during the postoperative period. in comparison with the preoperative period all through the review days, which is consistent with the results from the study by Ibikunle et al. (Ibikunle et al., 2016) .

In a study on the effect of impacted third molar removal on oral health quality of life by Van Wijk et al., in which they used the Dutch version of Oral Health Impact Profile-14 (OHIP-14) a deterioration in the quality of life of patients in the postoperative period was reported.(Van Wijk, Kieffer, & Lindeboom, 2009)

The present study showed that group 3 (control group) reported more impairment of their eating ability and diet variation throughout the postoperative period than the other groups which is consistent with the results in the study by(Chaudhary et al., 2025)

However, there were statistically significant differences in all the postoperative review days in the respective subscales except on POD 3 in the “Ability to chew food” and “Changes in diet” subscales, which is in accordance with results of the study by Grossi et al(Chaudhary et al., 2025). The ongoing inflammation within the muscles of mastication like the masseter and medial pterygoid muscles and their overlying mucosa that results in pain and trismus, making masticatory movement difficult could be the reason for the observed impairment in chewing ability that was seen in this study.

This study showed that the significant improvement recorded in groups 1 and 2 could be due to the anti-inflammatory effect of dexamethasone on pain, swelling, and trismus. The earlier recovery seen in group 2 compared to groups 1 and 3 could be attributed to the localized concentration of dexamethasone within the operative site. These results are consistent with the finding in the study by Ibikunle et al (Ibikunle et al., 2016).

The patients with impairment in swallowing in all groups were found to be highest on POD 1, this is in agreement with the study by Ibikunle et al (Ibikunle & Adeyemo, 2017), in their study they found that swallowing was affected most on POD 1 while minimal effect occurred by POD 7. The impairment in swallowing could be explained by the distal relieving incision, which could cause pain and inflammation posterior to surgical site involving the oropharyngeal region. Similar findings have been reported where most of the patient’s reported impairment in swallowing(Braimah et al., 2016)

Change in the diet was markedly seen on POD 1 in all three groups. However, the percentage of the affected patients was higher in control group than in dexamethasone groups. Savin et al reported that about two-thirds of all their patients experienced a change in diet on POD 1(Taniguchi et al., 2022)

Group 2 had the least complaints about the change in diet. This may be due to the anti-inflammatory effect of dexamethasone which was deposited directly into the surgical site.

The majority of patients in all the groups were affected with impairment in their enjoyment of food on all the postoperative evaluation days. McGrath et al stated that enjoyment of food is positively correlated with the ability to chew, ability to swallow, and ability to taste(Pimenta et al., 2024). Furthermore, it is also possible that most patients probably stopped chewing on the operated side, leading to a reduction in the enjoyment of food.

This study showed that group 3 had the worst outcome regarding the ability to open the mouth and this was mostly seen on POD 1, which is also seen in the study by Garcia et al. who reported that a greater number of the patients in their study noticed significant changes in mouth opening mainly due to trismus on POD 1. (Balakrishnan, Narendar, Kavin, Venkataraman, & Gokulanathan, 2017)

Our study showed that there was no difference in taste perception between the patients in group 1 and group 2 on POD 3. However, there was a significant difference between the groups on POD 1 and POD 7. It was found that dietary change and food enjoyment varied significantly between the groups, which is in contrast to a study in which it was stated that dietary change and lack of enjoyment of food could not be linked to taste alteration. (Albuquerque et al., 2019). Nerve cords of chorda tympani are located lateral to the lingual nerve and are myelinated and very thin, therefore, compression during the lower third molar surgery or postoperative swelling can lead to a lack of taste. (Albuquerque et al., 2019). In this study, by POD 7, no patient reported taste alteration in the dexamethasone groups, which may be due to the anti-inflammatory effect of administered dexamethasone.

In our study it was found that there was impairment in speech in all the groups on POD 1, POD 3, and POD 7. However, the speech impairment improved by POD 7 with group 2 having the best outcome. The alteration in voice was observed on POD 1 in all the groups with group 3 reporting the highest impairment in voice which took a downward trend across POD 3 and POD 7 with a statistical difference between the groups in all the postoperative days. This is in agreement with studies that reported good outcome in speech impairment on POD 7 (Avellaneda-Gimeno, Figueiredo, & Valmaseda-Castellón, 2017). Allevendra-Gimeno et al., reported that surgical third molar extractions should have little or no effect on the ability to speak because the early phase of sound production is in the respiratory tract (as airflow from the lungs passes through the vocal cords whose vibrations cause cyclic puffs to be converted to sound), while in the oral cavity, changing the position of the mouth, creates a wave of resonance that results in the creation of various tones. (Avellaneda-Gimeno et al., 2017). Additionally, Honda et al. concluded that third molar surgery neither causes restriction of tongue mobility nor volume obliteration of the oral cavity, therefore little or no interference in speech is expected. This study showed that some patients in the dexamethasone groups had mild alteration or impairment in their voices and how they spoke on POD 3 and POD 7. This could probably be due to the anti-inflammatory effect of dexamethasone.

The study also shows that there were statistically significant differences between the patients in Groups 1, 2, and 3 on all the post-operative days (POD 1, 3, and 7), in regards to problem falling asleep. It was found that these disturbances in the sleeping patterns improved significantly as the OHIP-14 values decreased from POD 1 to POD 7. This finding is similar to the findings in the study by Majid et al., who compared QoL in patients who received no steroids, submucosal steroids, or intramuscular steroids and found that patients with no steroids have more sleep disturbances than those who received steroids. (Majid, 2011) However, sleep impairment was mainly observed in the early POD 1 and POD 3, but by POD 7, all patients reported that the perceived discomfort in

their sleep had normalized. Pain is often stated as the reason for sleep disturbances whenever it happens(Majid & Mahmood, 2013).

This study shows a significant change in appearance in all the groups which was higher on POD 1 than on POD 3 and POD 7. More patients reported impairment in the control group than in the oral and topical dexamethasone groups. There was a statistically significant difference between the groups in the degree of alteration of physical appearance on all the postoperative evaluation days. This may be due to the anti-inflammatory effect of dexamethasone with its attendant reduction in inflammatory exudates.

The results of this study showed that patients in the control group were significantly affected in carrying out their daily activities than those in the dexamethasone groups on all the postoperative evaluation days. This may be due to improved overall outcomes in physical appearance and low pain perception that were observed in the dexamethasone groups. Patients in all the groups were affected more on POD 1 than POD 3 and POD 7. Most patients in all the groups on POD 1 could not attend to their usual duties during the immediate postoperative period. An improvement was found in duty impairment in all groups from POD 3 and by POD 7, all patients, irrespective of the groups, were able to keep or resume their usual work activities. Swelling, pain, impairment in physical appearance, or a combination of these factors was stated by some patients as the reason for not being able to attend to their usual work activities. The patients who reported a loss of day's at work irrespective of the group did so on POD 1, but by POD 3 and POD 7, most of the patients were able to resume their usual activities. This was also shown in other studies which reported a loss of day's at work during the postoperative days following mandibular third molar removal.(Duarte-Rodrigues et al., 2018)

Conclusion

The present study shows that intra-alveolar application of dexamethasone following the surgical removal of IMTMs showed the least deterioration in the patients' quality of life in the immediate postoperative period and particularly POD 1 and POD 3.

Topical (intra-alveolar) dexamethasone administration provided better improvement in postoperative quality of life in comparison with oral dexamethasone administration. The technique for topical (intra-alveolar) dexamethasone administration is simple, painless, and convenient for both the surgeon and the patient. The topical (intra-alveolar) route of administration offers the advantage of concentrating the drug near the surgical site with reduced systemic absorption and possibly fewer systemic side effects. Therefore, the topical (intra-alveolar) route of administration of dexamethasone shows a better improvement of QoL in patients undergoing third molar surgery.

The strength of this study

This is a randomized controlled study. The study has been able to show that intra-alveolar administration of dexamethasone is a very safe and easy to apply route of medication following third molar surgery which we encourage practitioners to use. This route will reduce the frequency of drug use after third molar surgeries.

Limitations

1. Frequent review days were not feasible for some patients, leading to skipping of some review days.
2. The data on QoL were subjective i.e., based only on patient perspective.
3. The study only collected information for the first 7 days after surgery, consequently, the long-term changes in QoL after the third molar extraction could not be assessed.

Recommendation

-We therefore recommend that the post operative evaluation days should be extended beyond day 7 to see if patients can come up with complications following this route of dexamethasone applications.

-Patients undergoing third molar surgery should be counseled properly on the possible sequelae following the procedure on their QoL in the immediate postoperative period.

-Patient phone numbers and various social media platforms can be assessed to enable postoperative review of patients to be less difficult for those who may not be present on the review days.

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Appendix

Table 1: Sociodemographic distribution of patients among the three groups

	Group 1	Group 2	Group 3	Total
Age				
20-29	36(58.1%)	36(58.1%)	36(58.1%)	108(58.1%)
30-39	16(25.8%)	23(37.1%)	17(27.4%)	56(30.1%)
40-49	10(16.1%)	3(4.8%)	7(11.3%)	20(10.8%)
50 >	-	-	2(3.2%)	2(1.0%)
Total	62 (100%)	62 (100%)	62(100%)	186(100%)
Gender				
Male	21(33.9%)	20(32.3%)	30(48.4%)	71(38.2%)
Female	41(66.1%)	42(67.7%)	32(51.6%)	115(61.8%)
Total	62(100%)	62(100%)	62(100%)	186(100%)
Male: Female ratio	1:1.95	1:2.1	1:1.06	1:1.61

Table 2: Distribution of preoperative and postoperative overall mean QoL of the patients.

	Operative days			
	Pre-op	POD 1	POD 3	POD 7
GROUP 1				
Range	14-33	46-56	30-45	15-25
Mean ±SD	23.10 ±4.30	53.90 ±2.03	35.52 ±3.43	19.81 ±2.54
GROUP 2				
Range	17-35	42-49	24-29	14-25
Mean ±SD	24.79 ±3.79	47.34 ±1.64	27.27 ±1.36	18.00 ±1.80
GROUP 3				
Range	16-34	51-56	33-49	22-37
Mean (SD)	22.19 ±4.36	54.79 ±1.89	39.23 ±3.48	28.52 ±2.95
P value	0.002*	0.001*	0.001*	0.001*

Significance levels: p < 0.05*; p < 0.01**; p < 0.001****

Abbreviations: POD, Post-operative days; SD, Standard deviation.

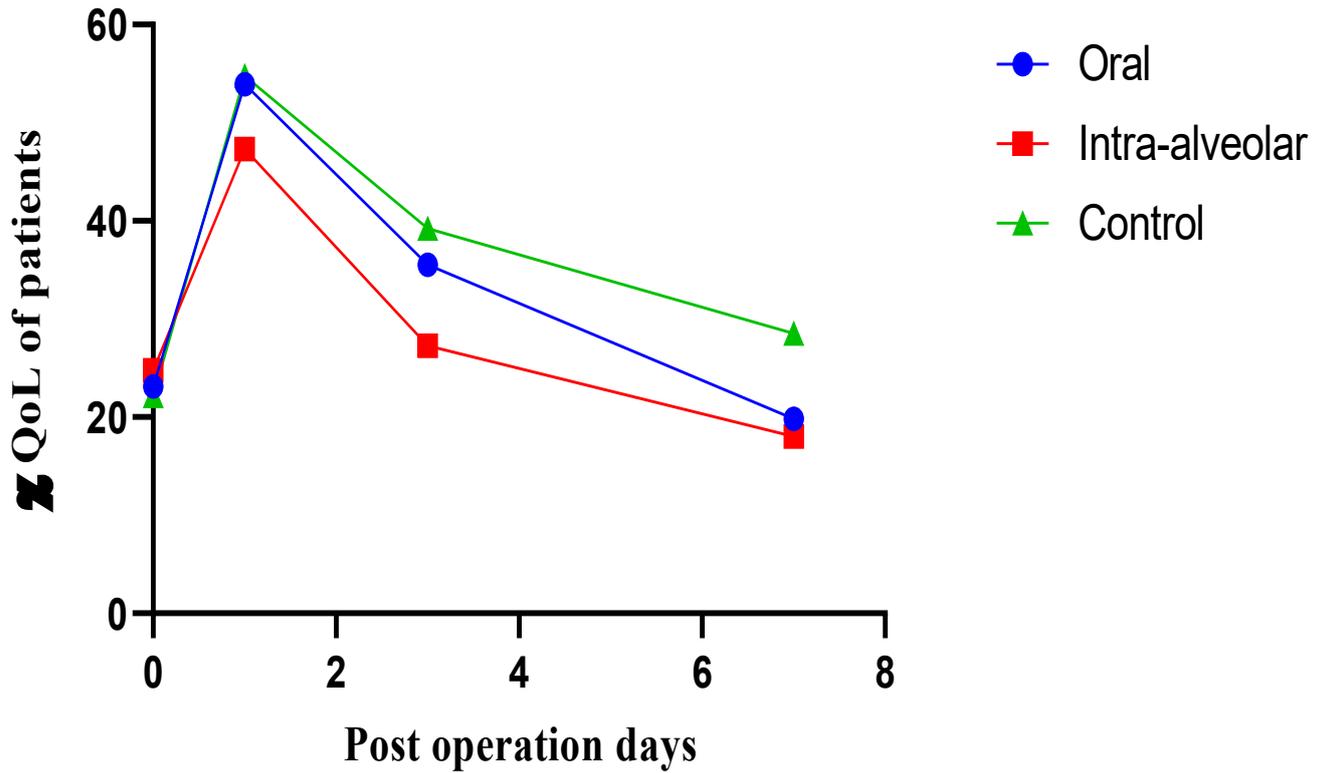


Fig. 2: Overall Post-operative mean distribution graph

Table 3: Distribution of the mean quality of life subscale scores in the preoperative and postoperative periods in all patients.

Subscales	Group 1 Mean \pm SD	Group 2 Mean \pm SD	Group 3 Mean \pm SD	p-value
Ability to chew food				
Pre-Op	2.63 \pm 0.87 ^{ab}	3.03 \pm 0.68 ^a	2.08 \pm 0.49 ^b	0.0001**
POD 1	6.66 \pm 1.62 ^b	6.64 \pm 1.04 ^b	7.78 \pm 0.89 ^a	0.0001**
POD 3	4.62 \pm 1.17	4.84 \pm 0.79	4.95 \pm 0.62	0.10
POD 7	2.02 \pm 0.56 ^{ab}	1.80 \pm 0.40 ^b	2.83 \pm 0.38 ^a	0.0001**
Ability to swallow food				
Pre-Op	1.42 \pm 0.59 ^a	1.61 \pm 0.69 ^a	1.24 \pm 0.43 ^b	0.002*
POD 1	3.90 \pm 1.19 ^b	3.82 \pm 1.06 ^b	5.06 \pm 0.87 ^a	0.0001**

POD 3	2.69 ±0.83 ^b	2.70 ±0.83 ^b	3.16 ±0.57 ^a	0.002*
POD 7	1.28 ±0.45 ^b	1.11 ±0.32 ^b	1.89 ±0.40 ^a	0.0001**
Change in Diet				
Pre-Op	1.98 ±0.80 ^a	2.06 ±0.60 ^a	1.35 ±0.48 ^b	0.0001**
POD 1	5.26 ±1.58 ^a	4.87 ±1.20 ^b	5.58 ±1.05 ^a	0.003*
POD 3	3.62 ±1.11	3.46 ±0.81	3.48 ±0.67	0.71
POD 7	1.64 ±0.58 ^{ab}	1.42 ±0.50 ^b	2.09 ±0.50 ^a	0.0001**
Enjoyment of food				
Pre-Op	1.53 ±0.56	1.47 ±0.56	1.13 ±0.34	0.0001**
POD 1	4.15 ±1.21 ^b	3.62 ±0.88 ^b	5.05 ±0.81 ^a	0.0001**
POD 3	2.84 ±0.80	2.56 ±0.70	3.08 ±0.51	0.0001**
POD 7	1.31 ±0.50 ^b	1.07 ±0.25 ^b	1.97 ±0.36 ^a	0.0001**
Ability to open mouth				
Pre-Op	2.23 ±0.80	2.95 ±0.88	2.26 ±0.65	0.0001**
POD 1	6.03 ±1.56 ^c	7.79 ±1.33 ^b	8.59 ±1.07 ^a	0.0001**
POD 3	4.15 ±1.12 ^b	5.36 ±0.98 ^a	5.44 ±0.79 ^a	0.0001**
POD 7	1.92 ±0.61 ^c	2.44 ±0.56 ^b	3.14 ±0.43 ^a	0.0001**
Food tasting ability				
Pre-Op	1.11 ±0.32	1.15 ±0.36	1.10 ±0.30	0.10
POD 1	3.56 ±0.81 ^b	3.66 ±0.79 ^b	4.25 ±1.18 ^a	0.0001**
POD 3	2.49 ±0.65	2.62 ±0.71	2.77 ±0.73	0.177
POD 7	1.08 ±0.28	1.03 ±0.18	1.48 ±0.53	0.0001**

Table 3 (continued)

Subscales	Group 1 Mean (±SD)	Group 2 Mean (±SD)	Group 3 Mean (±SD)	p-value
Changes in voice				
Pre-Op	1.03 ±0.18	1.24 ±0.43	1.08 ±0.28	0.001*
POD 1	3.03 ±0.18 ^b	3.23 ±0.42 ^b	4.11 ±1.07 ^a	0.0001**
POD 3	2.03 ±0.18	2.25 ±0.43	2.56 ±0.59	0.0001**
POD 7	1.00 ±0.00	1.00 ±0.00	1.48 ±0.56	0.0001**
Ability to speak				

Pre-Op	1.02 ±0.0	1.00 ±0.0	1.05 ±0.22	0.34
POD 1	3.05 ±0.38 ^b	3.00 ±0.00 ^b	3.21 ±0.51 ^a	0.0001**
POD 3	2.03 ±0.00	2.00 ±0.00	2.06 ±0.30	0.07
POD 7	1.02 ±0.13	1.00 ±0.00	1.20 ±0.41	0.0001**
Difficulty in understanding you when you talk				
Pre-Op	1.00 ±0.0	1.00 ±0.0	1.02 ±0.13	0.10
POD 1	3.00 ±0.00 ^b	3.00 ±0.00 ^b	3.41 ±0.87 ^a	0.0001**
POD 3	2.03 ±0.00	2.00 ±0.00	2.06 ±0.30	0.07
POD 7	1.02 ±0.13	1.00 ±0.00	1.20 ±0.41	0.0001**
Difficulty in understanding you when you talk				
Pre-Op	1.00 ±0.0	1.00 ±0.0	1.02 ±0.13	0.10
POD 1	3.00 ±0.00 ^b	3.00 ±0.00 ^b	3.41 ±0.87 ^a	0.0001**
POD 3	2.00 ±0.00	2.00 ±0.00	2.20 ±0.44	0.0001**
POD 7	1.00 ±0.00	1.00 ±0.00	1.20 ±0.44	0.0001**
Changes in appearance				
Pre-Op	1.47 ±0.62	1.65 ±0.48	1.48 ±0.54	0.10
POD 1	4.70 ±1.43 ^{ab}	4.28 ±1.13 ^b	5.92 ±1.29 ^a	0.0001**
POD 3	3.08 ±0.94 ^{ab}	2.97 ±0.73 ^b	3.70 ±0.79 ^a	0.0001**
POD 7	1.62 ±0.52 ^{ab}	1.31 ±0.47 ^b	2.23 ±0.58 ^a	0.0001**
Unusual appearance				
Pre-Op	1.37 ±0.55	1.52 ±0.50	1.27 ±0.45	0.028*
POD 1	4.51 ±1.22 ^b	3.84 ±0.93 ^c	5.30 ±0.92 ^a	0.0001**
POD 3	2.93 ±0.79 ^b	2.67 ±0.65 ^c	3.30 ±0.58 ^a	0.0001**
POD 7	1.57 ±0.50 ^{ab}	1.16 ±0.37 ^c	2.00 ±0.44 ^a	0.0001**

Table 3 (continued)

Significance levels: p < 0.05*; p < 0.01**.

Subscales	Group 1 Mean (\pmSD)	Group 2 Mean (\pmSD)	Group 3 Mean (\pmSD)	p-value
Problem falling asleep				
Pre-Op	2.19 \pm 0.88 ^a	2.63 \pm 0.75 ^a	1.76 \pm 0.67 ^a	0.0001**
POD 1	4.82 \pm 1.53 ^c	4.84 \pm 1.04 ^b	5.89 \pm 1.18 ^a	0.0001**
POD 3	3.51 \pm 1.15	3.74 \pm 0.84	3.84 \pm 0.82	0.057
POD 7	1.3 \pm 0.50 ^b	1.13 \pm 0.34 ^b	2.05 \pm 0.52 ^a	0.0001**
More interruptions in sleep				
Pre-Op	2.39 \pm 0.80 ^a	2.55 \pm 0.78 ^a	1.69 \pm 0.59 ^b	0.0001**
POD 1	5.77 \pm 1.27 ^c	5.56 \pm 1.18 ^b	6.95 \pm 1.23 ^a	0.0001**
POD 3	3.98 \pm 1.04	3.97 \pm 0.98	4.30 \pm 0.89	0.12
POD 7	1.59 \pm 0.56 ^b	1.48 \pm 0.50 ^b	2.55 \pm 0.59 ^a	0.0001**
Impaired ability to perform duty at work				
Pre-Op	1.76 \pm 0.78 ^a	1.74 \pm 0.65 ^a	1.18 \pm 0.39 ^b	0.0001**
POD 1	4.59 \pm 1.49 ^b	4.02 \pm 0.87 ^c	5.47 \pm 0.93 ^a	0.0001**
POD 3	3.16 \pm 1.07	2.85 \pm 0.73	3.33 \pm 0.57	0.009*
POD 7	1.43 \pm 0.53 ^b	1.11 \pm 0.32 ^b	2.13 \pm 0.49 ^a	0.0001**