Effect of music on preoperative anxiety using the Hamilton State-Trait Anxiety Inventory (STAI) in patients undergoing cataract surgery in the University of Nigeria Teaching Hospital, Ituku Ozalla

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ABSTRACT

Introduction To determine the effectiveness of music in allaying preoperative anxiety in patients scheduled for and undergoing surgery for age-related cataract.

Methods This is a randomised interventional study of individuals aged 50 years and above who were scheduled for and undergoing cataract surgery under regional anaesthesia, with music (test group) randomly matched with similar individuals undergoing the same procedure but without music (control group). The surgeries were performed at the Ophthalmology Theatre of the University of Nigeria Teaching Hospital (UNTH), Ituku Ozalla, Enugu, Nigeria. Using a systematic random sampling method, a total of 98 patients were selected into two groups. Both groups completed the State-Trait Anxiety Inventory (STAI) Questionnaire at baseline, immediately on entrance into the preoperative room and 5 min after intervention. The first group listened to music while the second group did not listen to music. Results were analysed using the SPSS V.20 and analysis of variance was used to compare means of variables measured at baseline, preoperative before intervention and preoperative after intervention. Categorical variables were compared using the χ² test. Student’s t-test was used to analyse the continuous variables.

Results There was an increase in the anxiety scores in the two groups on entrance into the preoperative room, however, 5 min into intervention, there was a significant decrease in the anxiety scores in the music group and a progressive increase in the anxiety scores in the group without music.

Conclusion Music has a positive effect on preoperative anxiety evidenced by the indirect effect of music on the STAI anxiety scores.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Patients undergoing surgical procedure experience anxiety.

WHAT THIS STUDY ADDS

⇒ This study depicts that music is a valuable non-pharmacological agent that could be used to allay preoperative and intraoperative anxiety among patients undergoing cataract surgery.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The findings of this study would help in effecting a reduction in the comorbidities associated with surgical anxiety such as pain, expulsive choroidal haemorrhage from raised systemic blood pressure and corneal desiccation from dry eyes during surgery. Furthermore, music, which has been shown from this study to be a safer and more effective non-pharmacological intervention, would be adopted more in allaying anxiety due to surgical intervention. Thus, improving patient cooperation and surgical outcome. This study will augment existing literature on surgical anxiety, effect of music on ocular surgery anxiety globally as well as in Nigeria.

INTRODUCTION

Anxiety is regarded as the feeling of fear when confronted or faced with a stressful situation. The same also applies to the overwhelming feeling when faced with a threatening situation. Preoperative period can provoke the same feeling in patients scheduled for surgery.2 The hospitalisation that is involved in surgery could also be the reason behind the anxiety felt by surgical patients. These patients perceive this day as the most threatening and biggest day in their lives, hence the nervous feeling the display.3

Cataract surgery being a procedure majorly done with local anaesthesia creates these feelings in patients.4 This is because patients are understandably worried about the potential pain that they could feel during the whole procedure or the possibility of surgical complications that could arise.4 This has led to surgeons trying out different ways to allay
anxiety, thereby reducing the several complications that could happen with an anxious patient. In the 1800s, there has been recorded use of topical cocaine anaesthesia to perform cataract surgery including that done by Karl Keller and since then, majority of intraocular surgeries carried out in ophthalmology were done using regional anaesthesia; and this has created the need to continue the search for safer and more effective ways to enhance patient’s cooperation during surgery. Sedatives such as the benzodiazepines, for example (diazepam and alprazolam), have been used successfully because they have a calming effect. Regional anaesthesia has also been used such as peribulbar, retrobulbar and subtenon block with fair success. These are without problems, ranging from mild to severe complications such as respiratory depression with the use of benzodiazepines and risk of globe rupture/perforation associated with regional blocks.4

Relaxation techniques such as breathing exercises, massage and yoga have been shown to reduce anxiety. These are often employed as one element of a wider stress management programme, although it cannot be practiced in the surgical theatre, can decrease muscle tension, lower the blood pressure, slow heart and respiratory rates, among other health benefits.5 One of the demonstrated cognitive approaches to reduced anxiety which has been used both in and out of the surgical theatre is music.

At least one study has suggested that listening to certain types of music, particularly new-age music and classical music, can increase feelings associated with relaxation, such as peacefulness and a sense of ease.6 This non-pharmacological intervention can ideally be used preoperatively and intraoperatively to reduce anxiety and is less expensive and virtually harm free as opposed to the use of drugs and injections that has potential life and sight threatening complications.

According to the WHO in 2016, the proportion of anxiety globally which also included preoperative anxiety is about 3.6%.6 Several studies carried out have shown that there is a high prevalence of preoperative and intraoperative anxiety as seen in studies carried out in the northern and western part of Nigeria.7 8 A collaborative study done in the University of Nigeria Teaching Hospital (UNTH) and National Orthopedic Hospital Enugu, which are both south eastern hospitals, showed that preoperative anxiety is of high prevalence in this region, affecting the skills and productivity of the health professionals managing these patients.9

The effect of music on anxiety and as a relaxation therapy to alleviate anxiety has been studied globally and in Nigeria, although most done in Nigeria did not reflect it as a solution to preoperative anxiety in ophthalmology.10

This study will help to establish the effect of music on preoperative anxiety, help in reducing the comorbidities associated with preoperative anxiety and augment existing literature on surgical anxiety globally as well as in Nigeria.

METHODOLOGY

Study setting

This study was conducted at the Department of Ophthalmology of the UNTH, Ituku Ozalla, located 21 km from Enugu metropolis. UNTH, Ituku Ozalla is in Enugu West Senatorial Zone, which includes some parts of Enugu metropolis, while Enugu is the capital of Enugu State. Its longitude and latitude are 7.4619° E and 6.3014° N, respectively. In the 2006 census, the Enugu metropolitan area was estimated to have a population of 722,664, who are predominantly Christians. The ophthalmology department started in 1971 as a subdepartment of surgery, with the staff currently comprising of 7 optometrists, 14 residents, 10 nurses and 16 consultants. It also has a fully dedicated functional operating theatre with three suites. Ocular procedures are performed on a daily basis by different teams, running Mondays through Fridays and averaging 20 ocular surgeries or more weekly. It has various subspecialties at various levels of development namely, Public Health Ophthalmology, Glaucoma, Paediatrics Ophthalmology, Vitreo-retina, Low vision, Cornea and Anterior segment, Oculo-plastic and Neuro-ophthalmology. Cataract surgery, which is one of the most common ocular procedures done in UNTH, is carried out mainly with regional anaesthesia, while very few adults and children are done under general anaesthesia. On average, about 15 cataract surgeries are performed weekly.

Study design

This was a randomised interventional study of individuals aged 50 years and above who were scheduled for and undergoing cataract surgery, with music and regional anaesthesia, matched with individuals 50 years and above scheduled for and undergoing cataract surgery without music but also with regional anaesthesia in the Department of Ophthalmology Operating Theatre, UNTH, Ituku Ozalla, Enugu. Study participants were excluded from this study if they had cataract other than age-related and younger than 50 years of age, major ocular morbidity, had uncorrected hearing problems and declined to participate. Patients whose age were equal to or greater than 50 years, scheduled for cataract surgery at UNTH Ituku Ozalla under regional anaesthesia and consented to participate were enrolled into the study. A total of 98 participants were selected using a systematic random sampling method. Study participants were assigned into two groups (ie, group A, those that underwent surgery with music and group B, those that underwent surgery without music).

Sampling technique

Subjects that came for uncomplicated cataract surgery were recruited in the outpatient clinics following thorough clinical evaluations which included a systemic and ocular examinations with satisfaction of eligibility criteria for the study. Approximately 15 patients were recruited weekly for this study. The patients were fully educated on
Informed consent was obtained before the study, the surgery and the music method being used, and a written informed consent was obtained. Consenting individuals were enrolled based on the inclusion and exclusion criteria. The participants were randomised into two different study groups using systematic sampling method. This randomisation was done by the research assistant and the researcher was blinded to the groups. The participants were distributed to the groups as they presented starting with the first participant to present. The first participant enrolled became a member of the group A (odd numbers) and the next participant enrolled became a member of the group B (even numbers). Placement into these two groups continued in the same manner alternately as they were enrolled. At the end of each day, the last group of participants enrolled were noted and the next day the other group of participants started the day’s enrolment. For example, if five participants were enrolled in a day, with the fifth participant falling into the group A category, the next day subsequently started with the group B participants being enrolled first. Odd numbers (group A) were for individuals that underwent surgery while they listened to music and even numbers (group B) were for individuals that underwent surgery without music. Every patient used a particular earphone assigned to him/her in order to maintain sterility. All the measured indices were recorded in a data sheet assigned to each patient.

**Sample size determination**

The minimum sample size (n) for this study was determined using the formula for comparison between two groups/proportions. Sample size calculation was based on prevalence and results of similar studies among preoperative anxiety studies in cataract patients.\\(^{11}\) 

\[ Z_{\alpha} = \text{the standard normal variate at 95% CI if } p < 0.05 \text{ which equals } 1.96. \]

\[ Z_{\beta} = \text{power of the study at 80% from Z-table which equals } 0.842. \]

\[ P_1 = \text{the proportion of subjects who used preoperative and intraoperative music} \approx 0.6454.\]

\[ P_2 = \text{the proportion of subjects who did not use preoperative and intraoperative music} \approx 0.3546.\]

\[ (P_1 - P_2)^2 = \text{difference in independent proportions which equals } (0.6454 - 0.3546)^2 = 0.0846. \]

The minimum sample size was adjusted based on the probability of a non-response rate of 10% with the formula;

\[ n = \frac{1}{P(1-P)} \times r \times (P_1 - P_2)^2 + r \times (10\% \text{ of } n) = 42, \]

\[ r=10\% \text{ or } 0.1. \]

Thus, sample size for the two groups=47×2=94, n=94.

Increasing n by 10% to leave room for errors which involves any factor that would make any participant not to show up or have his/her surgery suddenly cancelled=94+10, n=104.

**Study instruments**

The Hamilton State-Trait Anxiety Inventory (STAI): This questionnaire distinguishes between state anxiety (a temporary condition experienced in specific situations) and trait anxiety (a general tendency to perceive situations as threatening).\\(^{12}\) It was developed originally to study and treat anxiety in adults, although now it can be used for screening anxiety disorders. This questionnaire was developed by Spielberger in 1968 and has been in use up until today. The questionnaire was designed to be self-administered; however, it can be interviewer administered if necessary. There is no time limit, however approximate time ranges from 4 to 10 min

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**Table 1** Sociodemographic characteristics of the 98 participants

<table>
<thead>
<tr>
<th></th>
<th>With music n=49(%)</th>
<th>No music n=49(%)</th>
<th>Total n=98(%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51–60</td>
<td>20 (40.8)</td>
<td>18 (39.7)</td>
<td>38 (38.8)</td>
<td>0.590</td>
</tr>
<tr>
<td>61–70</td>
<td>16 (32.7)</td>
<td>18 (36.7)</td>
<td>34 (34.7)</td>
<td></td>
</tr>
<tr>
<td>&gt;70</td>
<td>13 (26.5)</td>
<td>13 (26.5)</td>
<td>26 (26.5)</td>
<td></td>
</tr>
<tr>
<td>Mean±SD</td>
<td>64.27±7.58</td>
<td>66.14±9.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>28 (57.1)</td>
<td>34 (69.4)</td>
<td>62 (63.3)</td>
<td>0.102</td>
</tr>
<tr>
<td>Female</td>
<td>21 (42.9)</td>
<td>15 (30.6)</td>
<td>36 (36.7)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>41 (83.7)</td>
<td>46 (93.9)</td>
<td>87 (88.8)</td>
<td>0.193</td>
</tr>
<tr>
<td>Not married</td>
<td>8 (16.3)</td>
<td>3 (6.1)</td>
<td>11 (11.2)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Igbo</td>
<td>47 (95.9)</td>
<td>44 (89.8)</td>
<td>91 (92.9)</td>
<td>0.661</td>
</tr>
<tr>
<td>Others</td>
<td>2 (4.1)</td>
<td>5 (10.2)</td>
<td>7 (7.1)</td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christianity</td>
<td>46 (93.9)</td>
<td>47 (95.9)</td>
<td>93 (94.9)</td>
<td>0.999</td>
</tr>
<tr>
<td>Others</td>
<td>3 (6.1)</td>
<td>2 (4.1)</td>
<td>5 (5.1)</td>
<td></td>
</tr>
</tbody>
</table>

P-value, Probability Value.

**Table 2** Effect of music on the anxiety score in the two groups with time

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time</th>
<th>With music Means±SD n=49</th>
<th>No Music Means±SD n=49</th>
<th>T</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety score</td>
<td>Time 1  (before)</td>
<td>63.45±8.34</td>
<td>60.49±5.86</td>
<td>2.03</td>
<td>0.045</td>
</tr>
<tr>
<td>Anxiety score</td>
<td>Time 2  (after)</td>
<td>45.47±6.74</td>
<td>63.14±7.01</td>
<td>12.72</td>
<td>0.001</td>
</tr>
<tr>
<td>Mean difference (95% CI)</td>
<td>↓17.98 (15.9 to 20.8)</td>
<td>↑2.65 (0.9 to 4.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t (p value)</td>
<td>12.96 (0.001)</td>
<td>3.07 (0.003)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P-value, Probability Value.
depending on the educational level of the participant. The questionnaire consists of 40 questions, divided into 20 questions for each form and each STAI item is given a weighted score of 1–4. A rating of 4 indicates the presence of a high level of anxiety for 10 S-Anxiety items and 11 T-Anxiety items. A high rating indicates the absence of anxiety for the remaining 10 S-Anxiety items and 9 T-Anxiety items. The two forms of anxiety are separated in the inventory, and both are given their own 20 separate questions. The scoring weights for the anxiety-present items are the same as the blackened numbers on the test form. The scoring weights for the anxiety-absent items are reversed, that is, responses marked 1, 2, 3 or 4 are scored 4, 3, 2 or 1, respectively. This has been validated and used in Nigeria in 2009 in a study aimed at checking psychological states of amputees.\textsuperscript{13} The clinical cut-off for anxiety is a score of 41 and above. This questionnaire was interviewer administered for the purposes of this research.

Earphones: VectorStock earphones were used to listen to the music played by the mp3 (MPEG audio layer 111). The subject applied the earpiece to him/herself in order to get a more comfortable placement. Each patient was given a new earphone to wear in order to prevent infections.

Mp3 player: The 2019 New Stylish Mirror Portable MP3 Player, Mini Clip MP3 Player Walkman Sport Mp3 with dimension Approximately 4.3 cm × 2.9 cm × 1.5 cm played the chosen music. Patient’s preferred music was used and volume was set at the third volume click from the zero mark.

### Table 3  Effect of sociodemographic parameters and music on anxiety status

<table>
<thead>
<tr>
<th>Anxiety status</th>
<th>Yes n (%)</th>
<th>No n (%)</th>
<th>X²</th>
<th>OR (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No music</td>
<td>48 (98.0)</td>
<td>1 (2.0)</td>
<td>55.71</td>
<td>58.1 (8.2 to 200.0)</td>
<td>0.000</td>
</tr>
<tr>
<td>With music</td>
<td>27 (55.1)</td>
<td>22 (44.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51–60</td>
<td>24 (63.2)</td>
<td>14 (36.8)</td>
<td>6.17</td>
<td>3.30 (1.13 to 9.87)</td>
<td>0.013</td>
</tr>
<tr>
<td>61–70</td>
<td>51 (85)</td>
<td>9 (15)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>49 (79.0)</td>
<td>13 (21.0)</td>
<td>0.58</td>
<td>1.14 (0.49 to 4.14)</td>
<td>0.467</td>
</tr>
<tr>
<td>Female</td>
<td>26 (72.2)</td>
<td>10 (27.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>68 (78.2)</td>
<td>19 (21.8)</td>
<td>1.14</td>
<td>2.04 (0.39 to 9.02)</td>
<td>0.280</td>
</tr>
<tr>
<td>Single</td>
<td>7 (63.6)</td>
<td>4 (36.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tribe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Igbo</td>
<td>68 (74.7)</td>
<td>23 (25.3)</td>
<td>2.31</td>
<td></td>
<td>0.128</td>
</tr>
<tr>
<td>Others</td>
<td>7 (100.0)</td>
<td>0 (0.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christianity</td>
<td>70 (75.3)</td>
<td>23 (24.7)</td>
<td>1.61</td>
<td></td>
<td>0.204</td>
</tr>
<tr>
<td>Others</td>
<td>5 (100.0)</td>
<td>0 (0.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CI, Confidence Interval; OR, Odds Ratio; P value, probability value.

### Table 4  Effect of music on preintervention anxiety scores between the two groups

<table>
<thead>
<tr>
<th>Group membership</th>
<th>OR (95% CI)</th>
<th>P value</th>
<th>AOR (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No music</td>
<td>58.1 (8.2 to 200.0)</td>
<td>0.001</td>
<td>30.75 (3.85 to 245.3)</td>
<td>0.001</td>
</tr>
<tr>
<td>With music</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preintervention anxiety</td>
<td>1.39 (1.12 to 1.71)</td>
<td>0.002</td>
<td>1.25 (1.01 to 1.57)</td>
<td>0.045</td>
</tr>
</tbody>
</table>

AOR, Adjusted Odds Ratio; CI, Confidence Interval; P-value, Probability Value.
Table 5  Multiple linear regression of postintervention anxiety scores

<table>
<thead>
<tr>
<th></th>
<th>Unstandardised coefficients beta (95% CI)</th>
<th>Standardised coefficients beta</th>
<th>T</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Music</td>
<td>−18.64 (−21.3 to −15.9)</td>
<td>−0.835</td>
<td>−13.90</td>
<td>0.000</td>
</tr>
<tr>
<td>Before music</td>
<td>0.33 (0.14 to 0.51)</td>
<td>0.212</td>
<td>3.54</td>
<td>0.001</td>
</tr>
<tr>
<td>Constant</td>
<td>43.46</td>
<td></td>
<td>7.70</td>
<td>0.000</td>
</tr>
</tbody>
</table>

P value, probability value.

Study procedure
On admission, the STAI questionnaire was filled by the study participants, which served as the baseline indices. On entrance into the preoperative room, the STAI questionnaire was filled for the second time. Earphones were put in place and preferred music was played for the group A for 5 min, after which the STAI questionnaire was filled again for the third time. The music was played with the aid of a disposable earpiece. Same process was repeated for the group B except that music was not played after the earphones was put in place (online supplemental files 1; 2).

Data analysis
Data obtained from the study was first entered in the Microsoft Excel spread sheet of the computer, cleaned and coded. Data were subsequently imported into the SPSS (Statistical Package for Social Sciences) V.20 software for analysis. Tables and charts were used where appropriate. Categorical variables were compared using the χ² test and its variants. Student’s t-test was used for continuous variables such as comparing preintervention and postintervention means of both groups. Analysis of variance was used in comparing means with more than two variables. P value of less than 0.05 was considered as statistically significant.

Ethical considerations
This research was conducted according to the tenets of the National health research Ethics and the department of health. Permission was sought from the consultants operating in the theatre where the study was carried out and also from the Head of Department of Ophthalmology. A written informed consent was obtained from the study participants. This study also adhered to the declaration 32 of Helsinki which states that the participation by individuals capable of giving informed consent as subjects in medical research must be voluntary. Participants were told of their right to decline or withdraw from the study at any point without any consequences. Data collected for this research was stored in password protected computers and participants names were made anonymous. Notably, the participants were told that their data will not be accessible to a third party without their consent. Interviews and screening were carried out privately, and the research was non-invasive and did not inflict any form of bodily or emotional harm on the participants.

RESULTS
Out of the 98 study participants, the higher percentage (38.8%) fall into the age group 51–60. Majority of the participants are men (63.3%), married (88.8%), of Igbo ethnicity (92.9%) and practice Christianity (94.9%). The sociodemographic characteristics of the participants in terms of age, sex distribution, marital status, religion and ethnicity shows no statistically significant difference between the two groups as indicated by the p values (table 1).

The effect of music on the mean anxiety score of the two groups at two different times (before intervention, time 1 and 5 min after intervention, time 2) shows that in the music group, the anxiety score was decreasing with time while there was an increment with time in the no music group (table 2).

The social demographic parameters which include sex, marital status, tribe and religion had no effect on the anxiety status within either or between the two groups (table 3).

When multiple linear regression was fitted to determine the independent effect of music on anxiety scores while adjusting for the influence of differences in preintervention (before music) anxiety scores, it shows that music still had a significant effect on postintervention anxiety scores, p=0.001 (table 4). This indicates that a participant in the music group after listening to music had on average an anxiety score −18.64 (95% CI= −21.3 to −15.9) lower compared with participants in the no music group who had the same or similar preintervention anxiety score. This also indicates that group membership was the stronger or main determinant of postintervention anxiety score (standardised coefficient=0.835) compared with preintervention anxiety state or score (table 5). Therefore, comparing time 1 (before music was played) and time 2 (after the duration music played for experimental group has elapsed) shows that music significantly reduced the anxiety score more in the intervention group relative to the no music group (see online supplemental figures A,B).

DISCUSSION
The present study examined the effect of music on the level of preoperative anxiety in patients slated to undergo cataract surgery. Anxiety levels were measured using the STAI questionnaire between the two groups at baseline,
immediately in the preoperative room and 5 min after intervention.

Majority of the participants recruited into the study were men which is in contrast to global prevalence of cataracts with more women being affected than men. As regards to marital status, there were more married people in the two groups than single people. This may be related to the age bracket in the inclusion criteria. In the study area, most people in that age bracket are either married, divorced or widowed. Studies show that relationship status can lead to several forms of mental state volatility, ranging from depression to anxiety, and these are seen more in single people than in married individuals. The effect of marital status was isolated using multiple linear regression which showed that it did not affect the outcome of this study. The majority of the participants are of Igbo extraction and it is not surprising because the study was conducted in the south eastern part of Nigeria, an area dominated by Igbos. Ethnicity, however, did not affect the outcome of the study. It was also noticed that most of the participants in both groups are Christians. This is probably due to Christianity being the predominant religion practiced in the south eastern part of Nigeria. In terms of sociodemographic parameters, the two groups were similar. Overall, the sociodemographic parameters did not affect the outcome of this cohort study. On eliciting the effect of music on preoperative anxiety using the STAI questionnaire, this study noted that music had a beneficial effect on anxiety score.

Music is a well-known, non-invasive, non-pharmacological strategy for reducing anxiety. Several studies reported similar findings. These studies suggested several possible mechanisms through which music may act to reduce anxiety. Music is thought to reduce the adrenergic (sympathetic) nervous system and neuroendocrine activity. It also has an effect on the limbic system leading to a decrease in the neurotransmission of uncomfortable feeling while also favouring the release of endorphins. Music is also thought to reduce anxiety by providing a distraction and altering the perception of time.

A similar study done in France compared the effect of participant preferred music to researcher predetermined music on mean anxiety score and found that although, as in this study music significantly reduced preoperative anxiety, there was no statistically significant difference on the effect of music between the patients exposed to self-selected music. From this, in applying the result of this study in the clinical setting, researcher’s predetermined music or participants’ self-selected music have equivalent effects. In another comparative study involving 141 patients in three groups, the effect of music with and without binaural beat audio were compared against each other and against non-use of music of any frequency. The result was similar to what we have in this study. Patients exposed to music showed statistically significantly reduced STAI scores in both intervention groups compared with the control group (p<0.001), while music with and without binaural beat audio did not differ significantly with each other.

Conclusively, preoperative anxiety is problematic in patients undergoing cataract surgery and there is also an effect of music on preoperative anxiety in patients undergoing cataract surgery in UTH Enugu. These indirect effects can be evidenced by the direct effects of music on the anxiety questionnaire scores. Music has been shown by this study to be a valuable non-pharmacological agent that could be used to allay preoperative and intraoperative anxiety in such patients.

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Mean anxiety score change (preintervention minus post intervention Anxiety Scores)

Change in Anxiety Scores after music

y = -0.84x + 35.9

pre intervention (before music) anxiety scores
Mean anxiety score change

Change in Anxiety Scores between time 1 and time 2

preoperative anxiety scores (time 1)

\[ y = -0.31x + 21.5 \]
Workflow Chart
Group A

Patients were recruited in the clinic and purpose of research explained to them.

On admission, patients filled the state trait anxiety inventory (1st time) and also chose their preferred music.

In the pre-op room the state trait anxiety inventory was filled (2nd time) and the preferred music was played with the use of earphones.

Music was played for 5mins. The state trait anxiety inventory was filled again (3rd time).

Patients wheeled into the theatre, surgery commenced and surgeon was blinded to the group of the subject.
Workflow Chart
Group B

Patients were recruited in the clinic and purpose of research explained to them.

On admission, patients filled the state trait anxiety inventory (1\textsuperscript{st} time).

In the pre-op room the state trait anxiety inventory was filled (2\textsuperscript{nd} time), earphones put in place although music was not played.

Patients wheeled into the theatre, surgery commenced and surgeon was blinded to the group of the subject.

Patient stays in pre-op room with earphones in place for 5mins after which the state trait anxiety inventory was filled again (3\textsuperscript{rd} time).