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Ethnic Variability in the Perception of Postoperative Pain In Jos, Plateau State, Nigeria

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Abstract

Background: Postoperative pain management is crucial to patient care and recovery after surgery. Effective pain control not only alleviates suffering but also facilitates quicker recovery, reducing the risk of complications such as chronic pain syndromes. By identifying ethnic differences in pain perception, healthcare providers can tailor their pain management strategies better to meet the needs of patients from diverse cultural backgrounds. This study therefore sought to determine and compare baseline and serial postoperative pain scores using a visual analogue scale among non-indigenous (Fulani, Hausa, Igbo, and Yoruba) and Indigenous ethnic groups (Berom, Tarok, Ngas, and Mwagavul) in Plateau State, Nigeria. **Materials and Methods**: This was a comparative cross-sectional study conducted among 88 adults of Indigenous and non-indigenous ethnic groups of Plateau State at the Jos University Teaching Hospital (JUTH) recruited through stratified random sampling. The equal proportion allocation technique was employed for gender and ethnic groups. Ethical clearance, informed verbal and written consent were obtained before the commencement of the study. Baseline pain scores were determined by a pressure algometer. A pressure of 20N was applied bilaterally on the trapezius muscle between the C7 spinous process and the acromial process, and then the

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subjects were asked to rate the pain they felt on a numeric rating scale (NRS). The average NRS score was taken as the baseline pain score. Serial 2-hourly postoperative pain scores were also assessed in the immediate 24-hour postoperative period. All analyses were conducted using Statistical Package for Social Sciences version 23 (SPSS Inc., Chicago, IL, USA). Significance was set at the $\alpha = 0.05$ level. **Results**: A total of 88 patients participated in this study with an equal number of gender and ethnic group representation. The median (IQR) age of study participants was 21 (19.2–35.6) years. No significant statistical difference in median baseline pain scores between the entire indigenous (21.5) and non-indigenous (21.0) ethnic groups, $U = 0.64$, $p = 0.22$. There was a statistically significant difference in baseline median pain scores between females (3.5) and males (2.0), $U = 3.0$, $p = 0.036$ in the indigenous and females (3.0) and males (2.0) in the non-indigenous ethnic groups, $U = 3.9$, $p = 0.013$. This study revealed a statistically significant difference in the median serial postoperative pain scores in the different specific Indigenous ethnic groups ($H(2) = 24.2$, $p = 0.001$) and the different specific non-indigenous ethnic groups ($H(2) = 24.8$, $p = 0.001$) as well. **Conclusion**: This study has demonstrated ethnic and gender variability in the perception of pressure and postoperative pain among different ethnic groups resident in Plateau State. Clinicians need to be aware of the fact that different ethnic groups in Plateau State perceive pain differently and put it into consideration when treating pain.

Keywords: Ethnicity, Variability, Pain, Jos, Plateau State

INTRODUCTION

Postoperative pain management is crucial to patient care and recovery after surgery (Garimella & Cellini, 2013). Effective pain control not only alleviates suffering but also facilitates quicker recovery, reducing the risk of complications such as prolonged hospital stays and chronic pain syndromes (Jain et al., 2023). However, the perception and expression of pain can vary significantly across individuals, and these variations are often influenced by cultural, ethnic, genetic, and psychosocial factors (Rogger et al., 2023). In a multi-ethnic society like Nigeria, understanding the ethnic variability in the perception of postoperative pain is vital to improving patient outcomes and providing equitable healthcare (Campbell & Edwards, 2012).

In the context of postoperative care, these cultural differences contribute to disparities in pain management and patient satisfaction (Yelton & Jildeh, 2023). There is limited data on ethnic differences in postoperative pain perception in Nigeria, particularly in Jos,

Plateau State. Pain is a subjective experience, and understanding the ethnic and cultural factors that shape pain perception can help clinicians better assess and manage pain in their patients (Givler et al., 2024). In Jos, where diverse ethnic groups coexist, examining ethnic variability in pain perception can provide critical insights into the development of pain management protocols that address the needs of all patients, putting their ethnic background into consideration (Shah et al., 2024).

The findings of this study have the potential to significantly impact postoperative care in Jos and Nigeria as a whole. By identifying ethnic differences in pain perception, healthcare providers can tailor their pain management strategies better to meet the needs of patients from diverse cultural backgrounds. For instance, patients from ethnic groups that traditionally underreport pain may benefit from more proactive pain assessment protocols. In contrast, those from cultures that are more expressive about pain may require different forms of psychological or emotional support (Rogger et al., 2023). In both cases, a more individualized approach to pain management can improve patient satisfaction, reduce complications related to inadequate pain control, and ultimately enhance recovery outcomes. The insights gained from this study could inform healthcare policies and practices not only in Nigeria but also in other multi-ethnic countries where cultural diversity influences patient care. The specific objectives of this study were therefore to determine and compare baseline and serial postoperative pain scores using a visual analogue scale among non-indigenous (Fulani, Hausa, Igbo, and Yoruba) and Indigenous ethnic groups (Berom, Tarok, Ngas, and Mwagavul) in Plateau State, Nigeria.

MATERIAL AND METHODS

This study was conducted in the Jos University Teaching Hospital (JUTH), which serves as a training and referral centre to the many other secondary and primary health centres in Plateau State and its neighbouring states. It was a comparative cross-sectional study design conducted among adult males and females, Indigenous and non-indigenous ethnic groups undergoing elective gastrointestinal surgeries like laparotomy for gastrointestinal pathologies, appendicectomy, or herniorhaphy under general anaesthesia. Inclusion criteria were Yoruba, Igbo, Hausa, Fulani, Berom, Tarok, Ngas, and Mwagavul ethnic groups, aged 18 to 60 years, body weight within 20% of ideal, and American Society of Anaesthesiologists physical status I and II. Exclusion criteria were patients with

psychiatric, cardiovascular, hepatic, or renal disease, diabetes mellitus, a history of alcohol or drug abuse, or use of chronic pain medication, previous surgery, or severe trauma. Females in days 1 to 4 of their menstrual cycle were also excluded from this study. The sample size for this study was calculated from the formula for the calculation of sample size in comparative cross-sectional studies (Senn & Bretz, 2007), which gave a total sample size of 88. Stratified random sampling was employed to recruit patients for this study.

Recruitment of participants who met the inclusion criteria for this study was done on the eve of their scheduled surgery. The equal proportion allocation technique was employed for gender and ethnic groups. Informed verbal and written consent was sought for and obtained before the commencement of the study. Baseline pain scores were then determined using the Fischer Handheld Pressure Algometer. A pressure of 20N was applied bilaterally at the centre of the lateral fibres of the trapezius muscle between the C7 spinous process and acromial process, and the subjects were asked to rate the pain they felt on the visual analogue scale (VAS). The average value of the VAS score on both sides was taken as the baseline pain score. A handheld slide rule-type Visual Analogue Scale with values from 0 to 10 cm was used to assess postoperative pain scores within the 24-hour postoperative period. 12 serial postoperative pain VAS scores were determined at 2 hourly intervals and recorded in a study proforma.

All analyses were conducted using Statistical Package for Social Sciences version 23 (SPSS Inc., Chicago, IL, USA). Significance was set at the $\alpha = 0.05$ level. Continuous variables were presented as median values and interquartile range, while categorical variables were presented as frequency and percent. The Mann-Whitney U and Kruskal Wallis tests were the statistical test of choice.

RESULTS

A total of 88 patients participated in this study with an equal number of gender representations (44 each for males and females). The median (interquartile range) age of study participants was 21 (19.2–35.6) years. Indigenous and non-indigenous ethnic groups were represented in this study in equal proportions (Table 1). The median (interquartile range) baseline pain scores for the specific indigenous ethnic groups were 1.3 (0.9–2.0), 2.5 (2.0–3.1), 4.0 (3.0–4.5), and 6.5 (5.0–9.0) for Tarok, Ngas, Berom, and Mwaghavul,

respectively, and for the non-indigenous ethnic groups, 1.0 (0.4–1.5), 2.0 (1.5–2.6), 3.5 (2.9–3.6), and 6.0 (4.0–9.0) for Fulani, Hausa, Igbo, and Yoruba, respectively (Table 2).

A Mann-Whitney U test showed no significant statistical difference in median baseline pain scores between the entire indigenous ethnic group (21.5) and the entire non-indigenous ethnic group (21.0), U = 0.64, p = 0.22 (figure 1). There was a statistically significant difference in median pain score between females (3.5) and males (2.0), U = 3.0, p = 0.036 among the indigenous ethnic groups (figure 2), and between females (3.0) and males (2.0) among the non-indigenous ethnic groups, U = 3.9, p = 0.013 (figure 3).

The Kruskal-Wallis H test showed a statistically significant difference between the median serial postoperative pain scores for the different specific Indigenous ethnic groups (H (2) = 24.2, p = 0.001) (figure 4), and a statistically significant difference in the median serial postoperative pain scores of the different specific non-indigenous ethnic groups (H (2) = 24.8, p = 0.001) (figure 5) as well.

Table 1. Demographic Characteristics of the Study Population

Characteristics	Values
Gender (Male: Female)	
Entire Study Population	44 (50%): 44 (50%)
Non-Indigenous Study Group	22 (25%): 22 (25%)
Indigenous Study Group	22 (25%): 22 (25%)
Age (Years)	
Entire Study Population	21.0 (19.2 – 35.6IQR)
Non-Indigenous Study Group	21.5 (19.0 – 25.0IQR)
Indigenous Study Group	21.0 (21.0 – 25.3IQR)
Ethnic Groups	
Non-Indigenous	
Fulani	11 (12.5%)
Hausa	11 (12.5%)
Igbo	11 (12.5%)
Yoruba	11 (12.5%)
Indigenous	
Berom	11 (12.5%)
Ngas	11 (12.5%)
Tarok	11 (12.5%)
Mwaghavul	11 (12.5%)
Total	88 (100%)

Table 2. Median Baseline Pain Scores for Specific Ethnic Groups

Ethnic Group	Median (IQR)	Visual Analogue Scale Score		
		Minimum	Maximum	Total
Indigenous				
Tarok	1.3 (0.9 – 2.0)	0.0	2.0	11
Ngas	2.5 (2.0 – 3.1)	1.5	3.5	11
Berom	4.0 (3.0 – 4.5)	2.5	5.0	11
Mwaghavul	6.5 (5.0 – 9.0)	3.0	10.0	11
Non-Indigenous				
Fulani	1.0 (0.4 – 1.5)	0.0	2.0	11
Hausa	2.0 (1.5 – 2.6)	1.0	3.0	11
Igbo	3.5 (2.9 – 3.6)	2.0	4.0	11
Yoruba	6.0 (4.0 – 9.0)	2.0	10.0	11

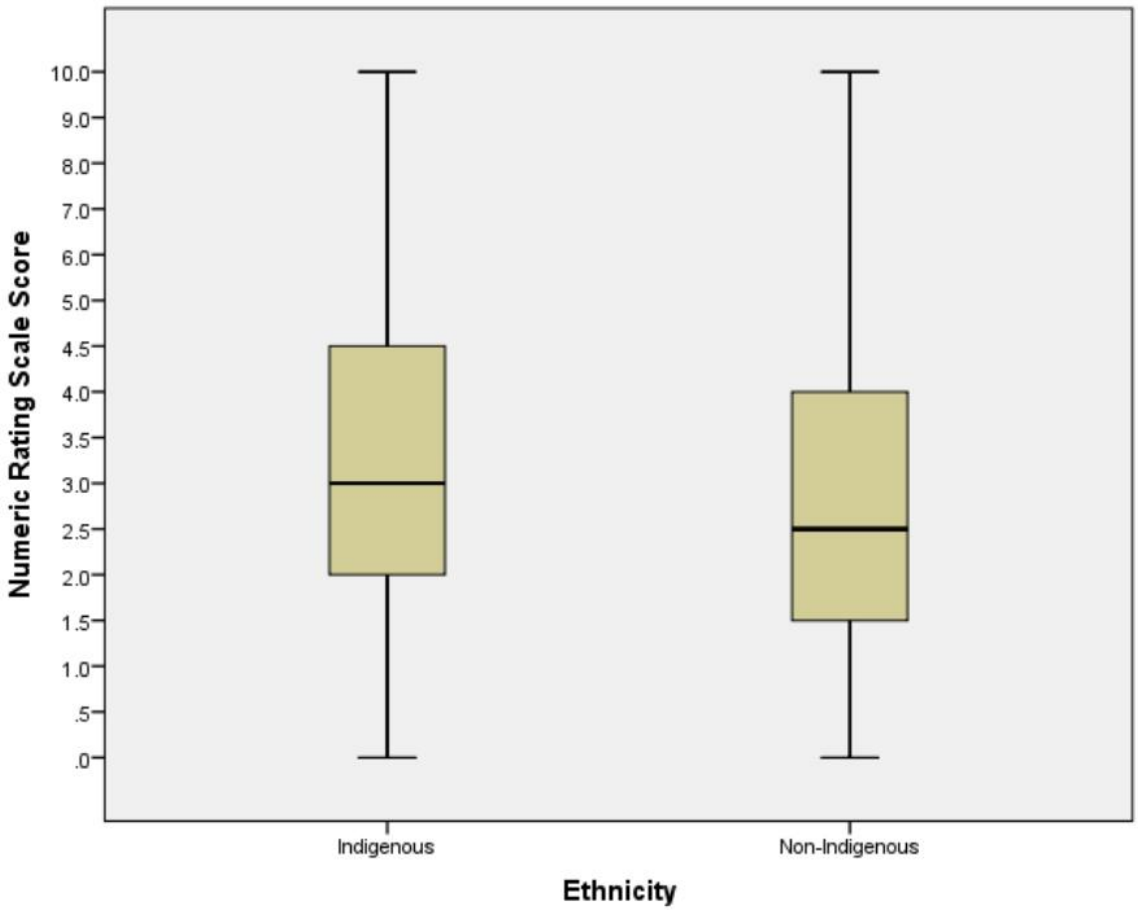

Figure 1 Comparison of Median Baseline Pain Scores between Indigenous and Non-Indigenous Ethnic Groups

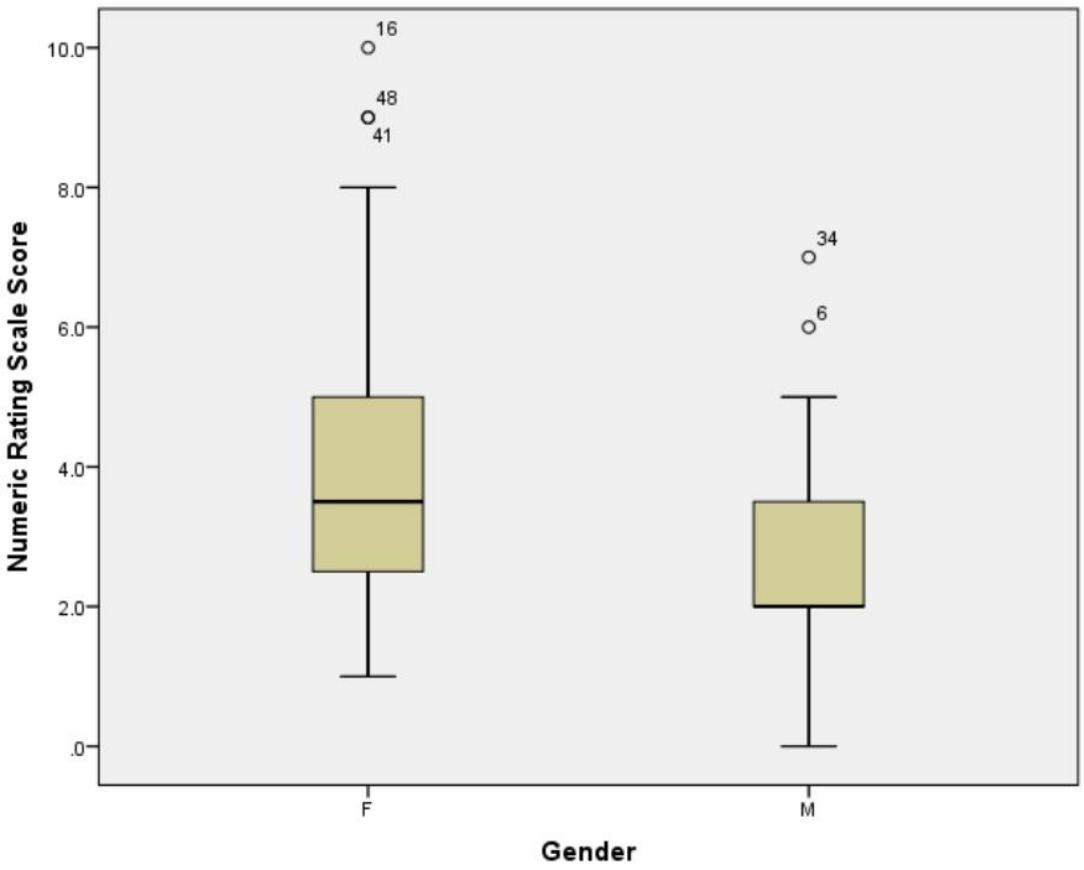

Figure 2 Gender Comparison of Median Baseline Pain Scores in the Indigenous Ethnic Groups

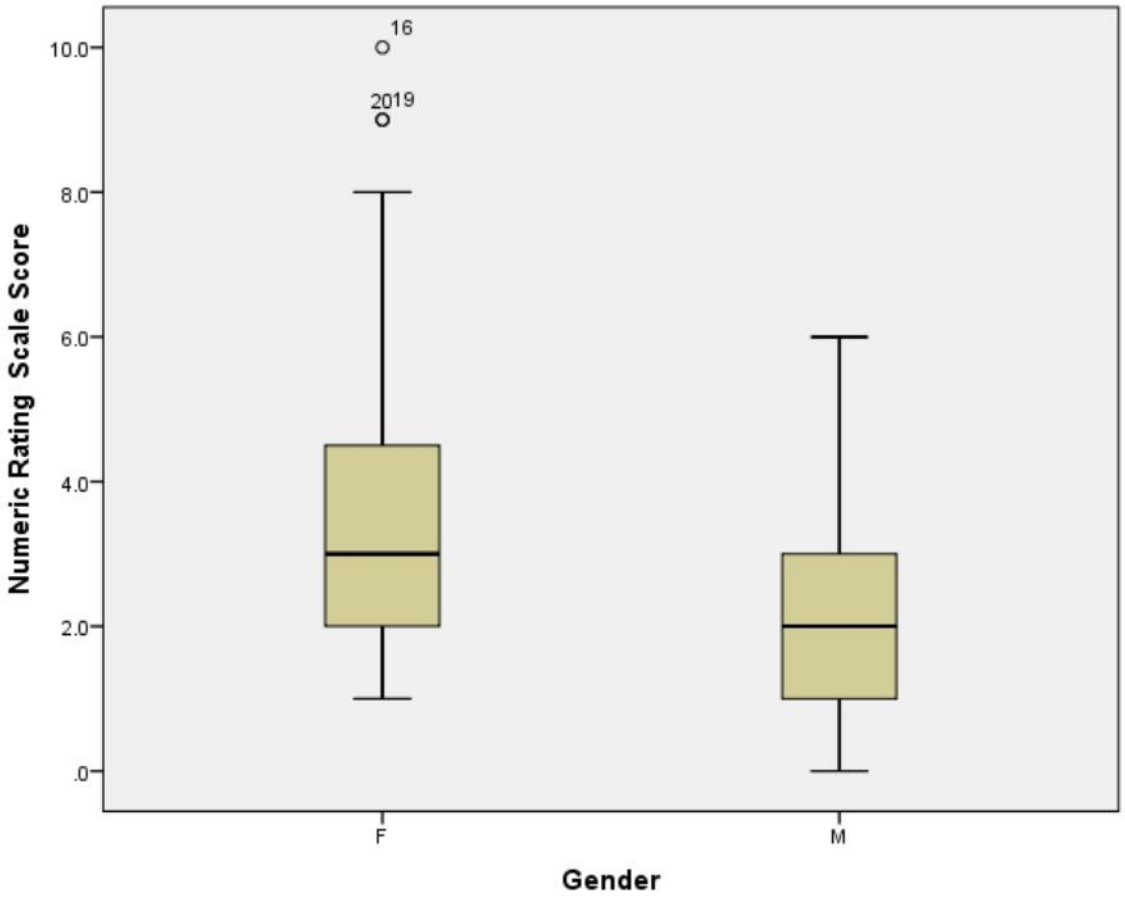

Figure 3 Gender Comparison of Median Baseline Pain Scores in the Non-Indigenous Ethnic Groups

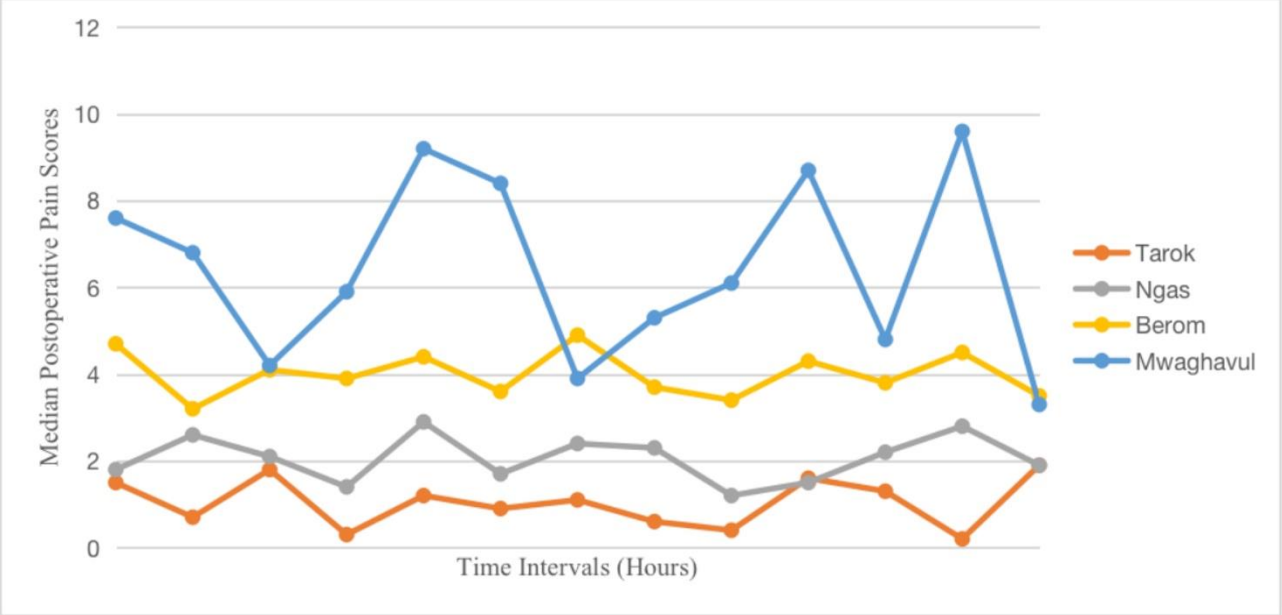

Figure 4 Two Hourly Serial Median Pain Scores in the 24 Hours Postoperative Period among Indigenous Ethnic Groups

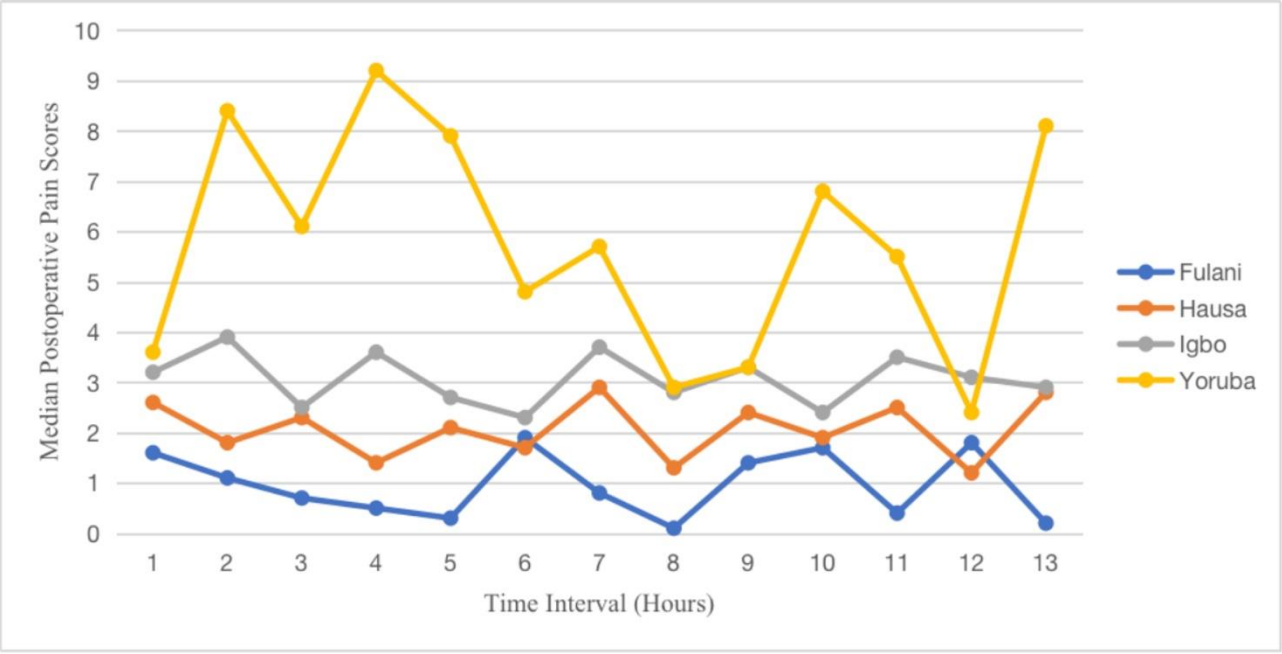

Figure 5 Two Hourly Serial Median Pain Scores in the 24 Hours Postoperative Period among Non-Indigenous Ethnic Groups

DISCUSSION

Ethnic and gender differences in pain perception have been documented in this study, with different categories of ethnic groups and genders showing varying pain scores. This study further revealed that there was no significant statistical difference ($p = 0.22$) in pain scores between the entire non-indigenous and entire Indigenous ethnic groups. This finding may have been a result of admixture of the specific ethnic groups (which had varying pain scores) in the entire strata of non-indigenous and indigenous ethnic groups, which would have cancelled out the different pain scores of the specific ethnic groups. The specific non-indigenous and indigenous ethnic groups, however, showed significant statistical differences ($p = 0.001$) in pain perception. The Fulani ethnic group had the least median baseline and serial postoperative pain scores, which means they felt the least pain, while the Yoruba ethnic group had the highest median baseline and serial postoperative pain scores, which means they felt the highest pain for the non-indigenous ethnic groups. For the indigenous ethnic groups, the Tarok ethnic group had the lowest median baseline and serial postoperative pain scores, which means they felt the least pain, while the Mwaghavul ethnic group had the highest median baseline and serial postoperative pain scores, which means they felt the highest pain.

The findings of this study are consistent with previously reported studies of ethnic/racial variations in pain perception (Ibrahim et al., 2008; Wang et al., 2007; Portenoy et al., 2004). The Fulani ethnic group has been previously shown to have a higher pain tolerance compared to other ethnic groups like the Yoruba and Hausa (Oniyide & Owoyele, 2019), which is consistent with the findings of this study. Similar to the decreased tolerance for pain found in this study for the Yoruba ethnic group are those reported in other studies (Olayemi et al., 2009; Audu et al., 2009 & Iliyasu et al., 2012), where it was reported that the Yoruba ethnic group consistently had the lowest pain threshold compared to the Hausa and Fulani ethnic groups. Although at the time of reporting this study, the researcher did not find reports on the variability in the perception of pain among the indigenous ethnic groups in Plateau State, e.g., Tarok, Ngas, Berom, and Mwaghavul ethnic groups, similarities exist in the pattern of pain scores between the non-indigenous and indigenous ethnic groups. This study shows that the Tarok, Ngas, Berom, and Mwaghavul ethnic groups had similar pain scores with the Fulani, Hausa, Igbo, and Yoruba ethnic groups, respectively. This incidental finding may not be unconnected with the fact that there may be some form of similarities between these ethnic groups.

The term ethnicity focuses on the distinction between groups of people who share a certain social background, distinguishing behaviours, culture, history, beliefs, conventions, and traditions as well as physical and genetic characteristics (Campbell & Edwards, 2012). The possibility of shared ancestry, similarities in geographical and environmental location, diet, and certain cultural beliefs and practices, which are subjects of further anthropological and genetic research, may be responsible for the similarities in the perception of pain in these ethnic groups. The aforementioned provides evidence in this study population that ethnicity influences the perception of pain and consequently its management, possibly playing a role in analgesic use. Consideration of individuals' ethnicity as a predictor of pain perception would make it necessary to modify therapy (as against a'standard' regimen) to suit ethnic groups known to have low pain thresholds. This will provide for adequate pain relief while minimizing the occurrence of adverse drug effects and other consequences of poorly treated pain (Meints et al., 2019).

Females had an overall statistically significantly higher median baseline pain score in this study compared to their male counterparts. This is consistent with several population-based surveys that have demonstrated higher pain scores among women than men (Kamaleri et al., 2008; LeResche, 2000; Fillingim, 2010; Averbuch & Katzper, 2001; Grossi et al., 2007; & Shabat et al., 2006). Wander and his colleagues, for example, found that pain-related stereotypic attributions differed across genders, with females having higher ratings compared to men (Wandner et al., 2012). Gender differences in pain perception do not only relate to experimental pain but also in clinical settings, with females perceiving pain of clinical conditions like osteoarthritis statistically higher than men (Bolaji et al., 2014; Nascimento et al., 2020). A higher degree of femininity or female social roles has been reported to be associated with lower thresholds and less tolerance for pain, as well as a greater natural tendency to communicate pain sensation (Oniyide & Owoyele, 2019). The differences in pain perception related to sex may also be associated with hyperalgesia in women, but also with the hypoactivity of the inhibitory system of pain in females (de-Araujo-Palmeira et al., 2011).

According to the biopsychosocial model of pain, pain perception and response are influenced by a complex interaction of psychosocial, cultural, and biological variables, including individual differences in nociceptive processing, sex role beliefs, pain coping strategies, mood, and pain-related expectations (Meints & Edwards, 2018). Sex hormones and cortisol are also known to affect pain responses, which may mediate the sex

differences in pain perception (Umar et al., 2017; Jagadamba et al., 2011). This study is limited by the fact that since it was conducted among some non-indigenous and indigenous ethnic groups in Plateau State, it may not be sufficient for generalization for other ethnic groups in Nigeria, but it has provided insight into variability in the perception of pain amongst different ethnic groups.

CONCLUSION

This study has demonstrated ethnic and gender variability in the perception of pressure and postoperative pain among different ethnic groups resident in Plateau State. Clinicians need to be aware of the fact that different ethnic groups in Plateau State perceive pain differently and put it into consideration when treating pain.

Recommendations

Clinicians should always be mindful of the ethnic variability in the perception of pain and put that into consideration when treating pain. Females should be given special consideration in the assessment and treatment of painful conditions because they are comparatively less tolerant to pain compared to their male counterparts. Treatment of pain should be modified to meet individual needs because pain is an individualized experience that needs to be seen and treated as such.

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