Preference of anesthesia types and associated factors among pregnant mothers scheduled for elective cesarean section in Addis Ababa Governmental Hospitals, Ethiopia: A Cross-Sectional Study

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Abstract

Background

Caesarean section is one of the most common operations done for women patients. General and regional anesthesia are the types of anesthesia used for C/S at current time to simplify surgery in the operating room. The aim of the study is to assess the pregnant mothers' preference and factors associated with their preference of anesthesia types for elective Cesarean Section at Addis Ababa Governmental MCH Hospitals.

Method and material:

Cross sectional study design was conducted. We collected data using interviewer administered questionnaire. Anxiety was measured using APAIS. Statistical analysis was done using the SPSS 26 version analysis tool. The descriptive statistic was used, to summarize data, tables and figures for displaying results. A multinomial logistic regression analysis was conducted to see the association between preference of anesthesia types and independent variables. Strength of association was measured by AOR within 95% confidence interval.

Results

Majority of the women, 62.3% preferred spinal anesthesia, 15.2% general anesthesia and 22.6% of them not decided anesthesia types. The odds of uneducated pregnant mothers not deciding anesthesia types rather than spinal anesthesia is nearly 8 times higher compared to mothers having college and above education status. (AOR = 7.760, 95% (CI 2.428, 24.803)). The odds of pregnant mothers who hadn't information about different types not deciding anesthesia types rather than spinal anesthesia is 38 times more likely compared to mothers who had get information from media. (AOR = 38.302 (5.196,282.333))

Conclusions

Educational status, occupation, type of previous surgery, type of previous anesthesia, source of information, and having information about different anesthesia types for CS were identified to be significantly associated with anesthesia type preference.

Introduction

Caesarean section is one of the most common operations done for women patients. It has been increasing in both developed and developing countries [1]. The optimal C/S rate is a matter of debate. WHO notes that while C/S rates of more than 15% do not seem to improve maternal or newborns health, rates of less than 5% tend to be linked to gaps in obstetric care units, exposing mothers and their newborns to poor health outcomes [2]. In recent years, China's C/S rate has reached a new high of 46%, with rates of 25% or more in several Asian and European countries, Latin America, and the United States. As some studies show Africa's C/S rate was 8.8%, ranging from 1.1% in Angola to 18% in the Democratic Republic of Congo [2–4].

General or regional anesthesia could be used for Cesarian Section. Spinal anesthesia is superior to General Anesthesia because, it has universal acceptance. But patients in many countries, including Ethiopia, still prefer GA and are afraid of regional block [3, 5–7].

Nowadays, the preference of anesthesia depends on multiple factors like the indication of surgery, the urgency of the operation, the surgeon's desire, the experience of the anesthetist, the obstetrical cause, babies' factor, available equipment and drugs, and the requests of the patient [4, 8]. According to research done in 2016 on the Perception, Knowledge and Attitude of Pregnant Mothers about Anesthesia for Cesarean Section in Ethiopia at Jimma University hospital 31.3% of mothers were aware of the existence of different anesthesia techniques. Since then, inappropriate choice of anesthesia type is a common problem in Ethiopia, it needs judgments of concerned body to decrease the patient's mortality [9].

From spinal anesthesia and general anesthesia, if general anesthesia has been selected in patients who underwent elective C/S, the patient's preference is the commonest reason [4, 10]. Pregnant mothers' preference and factors associated with their preference of anesthesia types for elective C/S is the big gap which need solution. This research is aimed at pregnant mothers'

preference and factors associated with their preference of anesthesia types for elective C/S so as to encourages anesthetists to use appropriate anesthetic techniques depending on the factors that lead to good anesthetic management.

Overall, there was a shortage of published data on the factors influencing anesthetic type preference for elective C/S both internationally and nationally, including Ethiopia. As a result, this study will enable the collection of reliable data that may be used to foresee a problem and guide improved management methods to reduce maternal mortality.

Methods and Materials

The study was conducted at two hospitals: Gandhi Memorial Hospital and Abebech Gobena MCH Hospital, both located in Addis Ababa from March to June 2022. A cross-sectional study design was used and the data collectors interviewed selected study participants. The study source of population were all pregnant mothers who were admitted at Addis Ababa Governmental hospitals, 2021/22 and the study units were patient who were scheduled for elective C/S at GMH and Abebech Gobena MCH Hospital. The study included all pregnant women who had schedule for C/S during the study period, had no contraindications for either method of anesthesia (regional or general), and agreed to participate and excluded patients with emergency C/S, ASA classes other than I and II, psychiatric problems or unconsciousness, and patients with age less than 18 were from the study. The sample size was determined by using the single population proportion formula. The preference of anesthesia type for cesarean section was taken from a previous study in southwestern Ethiopia in 2016, that was 23% preference of spinal anesthesia [9]. By taking p = 0.23, and adding a 10% non -response rate the actual total sample size for this study we got **272.** Systematic random sampling technique was used to select individuals at a fixed interval. The questionnaire mainly addressed socio-demographic variables (age, educational status, income level, occupation, residency, previous pregnancy number), maternity surgery and anesthesia history (types of surgery, types of anesthesia, anesthesia-related complications), and had information about anesthesia, sources of information factors (health professional's recommendation, relative's enforcement, information from friends, media and internal (mothers') feelings (good previous anesthesia and anxiety) and why they prefer each of the types. At last, for the anxiety measurement, we used the Amsterdam Preoperative Anxiety and Information Scale.

Data processing and analysis

All data were properly collected and entered into the prepared format, then entered, coded, and analyzed using the SPSS 26 version data entry and analysis tool. Descriptive analysis was done for Socio-demographic characteristic, surgery and anesthesia exposure, and anesthesia current preference analysis of the participants. A multinomial logistic regression analysis was conducted to see the association between dependent variable preference of anesthesia types and independent variables. In the multinomial logistic regression analysis, "spinal anesthesia preference" was the baseline category for the dependent variable, which was being compared with the other categories (general anesthesia preference versus spinal anesthesia preference; not decided types of anesthesia versus spinal anesthesia preference). Bi-variate analysis was done for each predictor variable and outcome variable, and with a P-value less than 0.2 was considered as a candidate for multinomial logistic regression analysis. Multinomial logistic regression was done and a statistical significance p-value of less than 0.05 was taken as a determinant factor. To check model fitness of multinomial logistic regression for our data using goodness of fit table Chi-square (Pearson and deviance) model test was used during the analysis. The strength of association was measured by AOR with its 95% confidence interval.

The APAIS comprised 6 questions where each component was scored from 1 to 5 (where 1 was none and 5 was the most anxiety or highest need for information). The anxiety score was calculated as the sum of items 1, 2, 4, and 5, and the need for information score was the sum of items 3 and 6. The score above 11 for the Anxiety subscale was taken as a sign that the patient was experiencing anxiety, and patients with scores of 5 and higher in information need not be concerned [11–13]. It was also validated in Ethiopia in 2019 by translating it to the Amharic language and is applicable in our country [14]. Prior to data collection, ethical clearance and permission were obtained from the Addis Ababa University, Addis Ababa Health bureau public health research and emergency management directorate, department of Anesthesia, and ethical clearance committee.

Operational Definition

Surgery and anesthesia history – had exposure to surgery and anesthesia previous to this surgery

Currently preferred anesthesia types- Type of anesthesia selected by pregnant mothers for this elective surgery

Not decided anesthesia types: not preferer any anesthesia types

Source Of information: From where pregnant mothers get information about presence of different anesthesia type first

Health professionals: All licensed professionals including Anesthesia professionals, Gynecologists, nurses, Midwifes, etc.

Results

Socio-demographic Characteristics of respondents shows that two hundred fifty-seven women participated in this study and thus yielding a response rate of 95%. Half of the respondents 50.2% belonged to the age group between 25 and 31 years, and 15(5.8%) belonged to the age group of > 39 years. The majority of them had an educational level of secondary school, followed by college and university. Of the respondents, 40.1%% had <1000 income and were housewives by occupation. Also, more than 80% (206) lived in Addis Ababa, and 44.1% of them were para 1 mothers. (Table 1)

The previous Surgery and Anesthesia exposure History of the respondent shows that out of 257 participants, 128(49.8%) of them had history of exposure to surgery and anesthesia, where CS took place in 38.1% while both CS and other surgery were conducted among 25(9.7%) of the respondent. From all respondents 78 (30.4%) of them experienced SA, 34 (13.2%) experienced GA and 17 (6.6%) of them experienced both of GA and SA. From all those exposed to anesthesia 71 of them had experienced complication related to anesthesia 81.7% from spinal anesthesia and 18.3% from GA.

From all participants only 81.7 % of them had information about presence of different anesthesia type for CS, while 18.3 % have no information on presence of different anesthesia type options for CS. The highest source of information of the respondent was from health professionals and from previous surgery exposure. (Table 2)

According to APAIS anxiety measuring score 46% of the population included in the study was anxious or total anxiety score above 11 and 56.4% need information on surgery and anesthesia.

Table 1. Socio-demographic characteristics of respondents in Addis Ababa governmental MCH Hospitals

Variable	Categories	Frequency	Percentage %
Age	18-24	39	15.2
	25-31	129	50.2
	32-38	74	28.8
	>39	15	5.8
	Total	257	100.0
Education status	Uneducated	34	13.2
	Primary	64	24.9
	Secondary	85	33.1
	college, university and above	74	28.8
	Total	257	100.0
Income	<1000	103	40.1
	1001-4000	56	21.8
	>4001	98	38.1
	Total	257	100.0
Occupation	house wife	100	38.9
	Employed	84	32.7
	private work	73	28.4
	Total	257	100.0
Residency	Addis Ababa	206	80.2
	Major regional city	42	16.3
	Rural area	9	3.5
	Total	257	100.0
Previous pregnancy number	NONE	63	24.5
	1	114	44.4
	>1	80	31.1
	Total	257	100.0

Table 2. Source of information

Source of information	Frequency	Percent %
Health professionals	77	30.0
Previous surgery	77	30.0
Relatives	5	1.9
Friends	40	15.6
Media	11	4.3
Total	210	81.7

The preferred anesthesia type was 62.3% (160) Spinal anesthesia, 15.2% (39) General anesthesia and 22.6% (58) of them were not decided anesthesia type to prefer.

Bivariable and Multivariable logistic regression analysis of factors associated with anesthesia type preference

Since the dependent variable has more than two category, multinomial logistic regression was used to assess the association between the independent variable and the dependent variables. According to the Bivariate analysis of multinomial logistic regression, there were significant relationships between some independent variables and preferred anesthesia types except residency, income, complication of general anesthesia, previous pregnancy number and Good previous Anesthesia. Variables having a p-value ≤ 0.2 in the bivariate analyses were used for multivariable logistic regression to control the confounding effect.

The findings of multivariable logistic regression show that six (6) risk factors (educational status, occupation, type of previous surgery, type of previous anesthesia, source of information, and having information about different anesthesia types for CS) were identified to be significantly associated with anesthesia type preference.

The odds of uneducated pregnant mothers not deciding anesthesia types rather than spinal anesthesia preference is nearly 8 times higher compared to mothers having college and above education status. (AOR = 7.760, 95% (CI 2.428, 24.803)).

The odds of primarily educated mothers not deciding anesthesia types rather than spinal anesthesia preference is nearly 4 times higher compared to mothers having college and above education status. (AOR = 3.757, 95% (CI 1.469, 9.604)).

The odds of employed pregnant mothers not deciding anesthesia types rather than spinal anesthesia is 76% less likely compared to mothers working at private. (AOR=.241 (.094,.618))

The odds of with previous only CS history pregnant mothers preferring general anesthesia rather than spinal anesthesia is 6.5 times higher compared to mothers who had previous both CS and other types of surgery. (AOR = 6.469, 95% (CI 1.415, 29.573)).

The odds of pregnant mothers who had previous exposure to only spinal anesthesia preferring general anesthesia rather than spinal anesthesia is 94% less likely compared to mothers exposed to both spinal anesthesia and general anesthesia. (AOR= .060, (CI.012,.301))

The odds of pregnant mothers who had information about different anesthesia types for CS not deciding anesthesia types rather than spinal anesthesia is 99.8% less likely compared to mothers who had no information about different anesthesia types for CS. (AOR =.002, 95% (CI.001, 0.014)).

The odds of pregnant mothers who hadn't information about different types not deciding anesthesia types rather than spinal anesthesia is 38 times more likely compared to mothers who had get information from media. (AOR= 38.302 (5.196,282.333))

The odds of pregnant mothers who had information from health professionals preferring general anesthesia rather than spinal anesthesia is 96% less likely compared to pregnant mothers who had information from the media. (AOR =.041, 95% (CI 0.013, 0.129)). (Table 3)

Goodness of fit table showed that the model adequately fits the data well. Pearson Chi-square (p-value = .324) and deviance (p-value =.759) which showed multinomial logistic regression model with predictor variables indicated a good fit.

Table 3. Multinomial Logistic regression analysis of factors associated with anesthesia type preference for elective C/S at Addis Ababa governmental MCH Hospitals.

		General anesthesia VS *Spinal Anesthesia.*		Not decided VS *Spinal Anesthesia.*	
Variables	Categories	COR	AOR (95%CI)	COR	AOR (95%CI)
Age	18-24	.69(.010,.459)	.428(.034,5.373)	.276(.064,1.195)	.137(.028,2.666)
	25-31	.351(.094,1.312)	.324(.205,1.514)	.392(.106,1.455)	.419(.275,1.637)
	32-38	.295(.074,1.181)	.245(.130,1.460)	.386(.099,1.505)	.265(.144,1.489)
	>39(ref)	1	1	1	1
Education status	Uneducated	1.429(.435,4.688)	.540(.013,2.218)	6.190(2.242,17.090)	**7.760*(2.428,24.803)**
	Primary	1.375(.550,3.436)	.610(.019,1.196)	3.792(1.547,9.293)	**3.757*(1.469,9.604)**
	Secondary	1.259(.557,2.849)	1.123(.049,1.311)	1.498(.597,3.758)	1.339(.141,2.813)
	College and above(ref)	1	1	1	1
Occupation	House wife	3.628(1.485,8.860)	2.536(.241,6.194)	1.036(.990,4.184)	.586(.280,1.224)
	G/employee	1.180(.447,3.118)	1.167(.071,2.397)	.509(.218,.788)	**.241*(.094,.618)**
	Private employee	1	1	1	1
Surgery and anesthesia history	Yes	2.749(1.359,5.562)	2.087(.021,2.369)	1.015(.555,1.856)	14.704(.402,537.415)
	No(ref)	1	1	1	1
Type of surgery	None	1.855(.392,8.780)	1.369(.280,6.691)	8.482(.097,65.564)	6.450(.023,62.391)
	CS	7.250(1.583,9.200)	**6.469* (1.415,9.573)**	1.500(1.588,9.395)	.736(.001, 1.978)
	Other	.667(.250,5.827)	.462(.336,3.636)	7.333(.357,150.708)	5.335(.239,112.526)
	Both(ref)	1	1	1	1
Type of anesthesia	None	.104(.032,1.342)	.107(.054,1.213)	1.157(.222,6.031)	1.217(.281,4.618)
	GA	.513(.137,1.923)	.600(.263,1.371)	.538(.424,15.211)	.667(.300,12.484)
	SA	.187(.057,.614)	**.060*(.012,.301)**	.840(.152,4.628)	.600(.105,3.382)
	Both(ref)	1	1	1	1
Anesthesia related complication	No history of surgery	.261(.056,1.225)	.440(.061,6.682)	.964(.178,5.222)	.617(.281,2.618)
	Yes	.958(.210,4.384)	1.560(.428,15.318)	.500(.082,3.046)	.614(.045,1.287)
	No	.486(.092,2.558)	.606(.097,12.657)	.771(.307,10.227)	.593(.319,1.100)
	Not remind(ref)	1	1	1	1
SA complication	No Spinal Anesthesia complication	.073(.007,.728)	.045(.003,1.664)	.454(.028,7.391)	.317(.001,4.502)
	Backache	.048(.002,1.040)	.286(.030,2.692)	.143(.004,4.612)	.455(.332,4.624)
	Headache	.222(.020,2.451)	.444(.063,3.155)	.133(.006,3.081)	.113(.030,1.583)
	Nausea and vomiting	.200(.017,2.386)	.364(.047,2.817)	.100(.003,3.153)	.019(.000,1.111)

	Shivering	1	1	1	1
Have information about anesthesia types	Yes	.443(.072,2.735)	.232(.003,1.363)	.008(.002,.029)	**.002*(.001,.014)**
	No(ref)	1	1	1	1
Source of information	Haven't information	1.333(.139,12.818)	.983(.091,10.627)	42.000(5.781,305.158)	**38.302* (5.196,282.333)**
	Health professional	.171(.034,.864)	**.041*(.013,.129)**	.043(.003,1.544)	.044(.003,1.578)
	Previous surgery	.870(.198,3.828)	.973(.220,1.631)	.717(.127,4.047)	.137(.062,1.302)
	Relatives	.667(.047,9.472)	.583(.302,1.128)	1.000(.063,15.988)	.667(.111,3.990)
	Friends	1.167(.251,5.413)	.333(.052,2.142)	.250(.029,2.156)	.083(.020,1.353)
	Media	1	1	1	1
Want to avoid previous anesthesia complication	Yes	4.786(.216,10.335)	4.571(.353,15.441)	.261(.059,1.163)	1.183(.131,10.685)
	No	1	1	1	1
Anxiety	No	.507(.258,.993)	.260(.110,1.616)	1.326(.715,2.457)	1.343(.797,2.263)
	Yes(ref)				
Information need	No	.520(.266,1.020)	.736(.336,1.613)	.165(.078,.350)	.071(.029,1.176
	Yes(ref)	1	1	1	1

*P value is significant at P< .05 Ref = reference Spinal Anesthesia = Baseline out come

COR= Crudes Odds Ratio AOR =Adjusted Odds Ratio CI = Confidence Interval

Discussion

During this study period, the preferred anesthesia types for CS by pregnant mothers were 62.3% spinal anesthesia, 15.2% general anesthesia, and 22.6% not decided types of anesthesia to prefer. This result is greater spinal anesthesia preference than the result of a study in Saudi Arabia that showed 53.5% of patients select spinal anesthesia for C/S, 42.9% select GA, and 3.6% do not know the anesthesia type. The difference could be from a difference in study design. They have been used in comparative design [15].

In contrast to our findings, the Turkish study on Factors Affecting Anesthesia Type Selection in Elective Cesarean Operations and Pregnancy Preferences for Anesthesia Outcome found that 64.2 percent of C/S patients preferred GA, whereas 35.8% preferred RA [16]. But we founded less selection of spinal anesthesia than the study in Pakistan at Lahore Hospital on Patients' Preference Regarding General or Regional Anesthesia for Elective C/S that indicates 71.7% of pregnant mothers preferred RA and 28.3% selected GA, and also the study on pregnant women at Aminu Kano Teaching Hospital in Nigeria who preferred RA at 73.0% for cesarean section and general anesthesia at 27.0% [17, 18]. The disparity of the results is most probably due to the differences in the distribution of study participants.

Another study in Ethiopia was a cross-sectional study on spinal anesthesia for CD at two teaching hospitals in Addis Ababa, which stated that the use of spinal anesthesia for C/S was 68.2%, which is approximately the same as our result [19]. As per a study done in Ethiopia at Jimma University hospital, 77% of pregnant women preferred GA and 23% of pregnant women preferred SA. It is completely different from our studies. The gap between the results will most probably be the differences in the study

area. Their study took place at Zonal Hospital, which may explain the difference in the abundance of information since our study population was 80% from Addis Ababa [9].

Our study was similar to the study done at Jordan University Hospital on Anesthesia for Cesarean Section in which spinal anesthesia was preferred by 63% of mothers. In this study, epidural anesthesia was preferred by 3%. However, we had not encountered other types of anesthesia choice, such as epidural anesthesia [20].

In our study we identified that education status, occupation, type of previous surgery, type of previous anesthesia, source of information, and having information about different anesthesia types for CS to be significantly associated with anesthesia type preference.

In our study, 81.7% of participants had information about the presence of different anesthesia types for CS, while 18.3% had no information on the presence of different anesthesia type options for CS, which is in line with the study conducted in Obstetrics of Pakistan that showed 85.7% of patients were aware of the techniques of anesthesia used in C/S [21]. But greater than the study on pregnant women at Aminu Kano Teaching Hospital in Nigeria that said 68.8% of them had knowledge of anesthesia for surgical procedures. The variation could be the differences in inclusion criteria. They include first and second trimester pregnant mothers. While this study only included those who were scheduled for C/S or third trimester, it included those who were assessed and informed prior to surgery [17].

This study observed the highest percent of sources of information among the pregnant mothers was from health professionals (30%) and from previous surgery exposure (30%), but the least was from relatives (1.9%) and friends (15.6%). This result shows a difference with that of the study conducted in Obstetrics of Pakistan, which showed the main sources of knowledge related to anesthesia were previous C/S (60.7%), relatives (12.5%) and anesthesiologists (10.7%) [21]. The difference could be from C/S history; in their sample was (66.1%), but we had only 47.8% and also, their sample size was less than this study’s sample size.

According to a study conducted in Obstetrics of Pakistan, patients' good experience with RA (19.6%) was the main reason why they preferred RA. However, according to our findings, it only weighs 7.8% [21]. One of the studies in Turkey told us physicians’ recommendations were seen as the most important factor than media for directing the patients to select regional anesthesia similar to our study [16].

Another study in Turkey told us that anxiety is an influential factor in GA preference. But in our study, anxiety was not a significant factor for GA preference in pregnant mothers for elective C/S. The difference could be from a difference in sample size (138) and a different tool for anxiety measurement [10].

A study on Factors influencing anesthesia type selection in elective cesarean operations and pregnant preferences for anesthesia outcome in Turkey found that as education level increased, so did the preference for RA [16]. Also, we identified the same idea with them. Because these patients have more information on anesthesia methods, they more frequently use the internet and obtain information from the people around them. But a study in Nigeria observed education as an insignificant factor [17]. They also identified income as a significant factor for RA preference. But we found income to be an insignificant factor. The alteration of the results could be from the differences in the distribution of study participants.

In our study, we observed preoperative information related to anesthesia and its source had a significant effect on anesthesia choice, which is similar to the study in Turkey and Iran [22, 23]. Similar to our study identified, occupation as a significant factor for anesthesia selection which is consistent with a study in Nigeria [17].

Age and number of pregnancies in our study had no significant effect on anesthesia selection. However, studies in Nigeria and Turkey found it as a significant factor. The reason may be due to the time they asked or the difference in the mothers’ stage of pregnancy, and also, they include age with less than 18. However, we only used term pregnant women and mothers over the age of 18 [17, 22].

Conclusions

In conclusion, preference of anesthesia type among pregnant mothers for elective C/S was 62.3% for spinal anesthesia, 15.2% for general anesthesia, and 22.6% not decided types of anesthesia to prefer. Significant factors associated with preference of anesthesia type among pregnant mothers for elective CS were identified as education status, occupation, type of previous surgery, type of previous anesthesia, source of information, and having information about different anesthesia types for CS.

Abbreviations

APAIS: Amsterdam Preoperative Anxiety and Information Scale; ASA: American Society of Anesthesiology; C/S: Cesarian Section; MCH: Mother and Child health; STAI: State-Trait Anxiety Inventory; AOR: Adjusted Odd Ratio; CI: Confidence Interval

Declarations

Ethical approval

The ethical clearance was obtained from the Institutional Health Research Ethical Review Board of the Institute of Health Sciences, Addis Ababa University, Ethiopia. All study procedures followed the Helsinki Declaration of human research. The objective of the study and its procedures were explained to all respondents. Written informed consent was obtained from all participants after explaining the purpose and benefits of the study.

Consent for publication

Not applicable.

Availability of data and materials

Data that support the findings are available and will be provided by the correspondence author on a reasonable request.

Competing interests

None.

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None.

Author Contributions

EB and SAY made the study and wrote the original manuscript draft. SAY did data collection, analysis, and interpretation. HS, MA and AS supervised the proposal development, data collection, research, and interpretation of data. EB, SAY, AS, MA, HS and AAU reviewed the draft manuscript for intellectual content and revised the final version of the manuscript. SAY is the guarantor of the study. All authors approved the final version of the manuscript.

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