Effect of an Educational Intervention Program on Pregnant Women's Ability to Cope with Childbirth Pain in Western Kenya

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Abstract

INTRODUCTION

Childbirth pain has remained a major challenge to women of child-bearing age over the years. Studies have shown that most women are not aware of the coping strategies to employ during childbirth. Severe childbirth pain can lead to adverse maternal and neonatal outcomes. Therefore, it is imperative to develop safe and innovative methods to cope with childbirth pain. The study aimed to investigate the effects of an educational program on women's ability to cope with childbirth pain in the context of lower and middle-income countries.

MATERIALS AND METHODS

A Quasi-experimental design was used to assess the impact of an educational intervention built on self-efficacy theory. Pregnant mothers were recruited at antenatal care services and were assigned to either the control group or the intervention group. The intervention group received two sessions of 2 hours each of the intervention between the 32nd–35th weeks of gestation. Follow-up and evaluation on outcome measures were conducted within 48 hours after delivery. The strength of pain was measured by the visual analogue pain scale and the Mac-Gill pain questionnaire.

RESULTS

Findings indicate that relative to the control group, the intervention group was significantly more likely to demonstrate lower perceived pain both on the visual analogue scale ($P<0.001$) and the McGill pain questionnaire ($P<0.001$).

Further analysis revealed that the non-intervention group had increased severe pain [OR=3.099,95% CI (1.080-8.887), P=0.035], unbearable pain [OR=27.930,95% CI (9.354-83.399), P=<0001], while permanent employment reduced unbearable pain [OR=0.038 95% CI (0.003-0.549), P=0.016].

CONCLUSION AND RECOMMENDATIONS

The educational intervention program was effective in decreasing pain intensity and severity during childbirth. Training programs should be integrated into the antenatal care program and offered to mothers during the third trimester of pregnancy to enhance women's coping skills during childbirth.

Keywords: Childbirth Pain, Coping, Educational Intervention, Pregnant Women

Introduction

Pregnancy and childbirth are important aspects of the woman's family and the community and are recognized globally as biological phenomena. They are associated with psychological, physical and social changes that are significant but challenging throughout a woman's lifetime. Childbirth remains a painful experience for the majority of women worldwide. [1]. Women express their intensified pain in various ways. These include: crying and screaming, scattering items, removing clothes, shouting and advocating for a caesarean section amongst others. These

expressions are considered pain-coping strategies.

Severe pains during labour may result in negative effects for both the mother and the baby. Previous investigations have established significant correlations between postpartum depression and the strength of childbirth pain [2]. In addition, too much pain may aggravate the mother's fear and anxiety during childbirth, which in turn stimulates the sympathetic nervous system, which culminates in increased pain, prolonged labour, and dissatisfaction with the childbearing experience [3]. Moreover, prolonged labour causes anxiety, fear, and fatigue, which are critical in reducing a mother's self-confidence and self-esteem and increase the chances of prenatal morbidity and mortality, interventions such as the use of oxytocin, analgesia, caesarean sections and instrumental deliveries. To date, reducing maternal and neonatal mortality and morbidity has remained a global public health challenge.

Accumulating evidence suggests that some interventions have proven to be effective in relieving or coping with pain, fear and anxiety during labour as well as promoting self-efficacy among women. These interventions include antenatal educational program in Korea among pregnant mothers [5]Mindfulness Childbirth Education in the United States has also been utilized and proven to have significant maternal psychological health benefits including better childbirth-related appraisals, less postpartum depression signs and limited use of pharmacological agents during childbirth [6].

Recently, it has been shown that the majority of women prefer non-pharmacological and non-invasive methods of pain relief in labour [9]. The efficacy-enhancing educational programme is therefore a viable option for most women in the Kenyan setting. Kakamega County is one of the largest counties in Kenya with the highest number of deliveries recorded yearly approximately 64,000[21] Majority of these births occur through spontaneous vaginal deliveries.

Addressing the issue of childbirth pain, fear and anxiety is a significant concern not only to women of reproductive age but also to the childbirth health specialists. However, little attention has been given to the aspect of fear, anxiety and pain during childbirth in the majority of healthcare facilities in Kenya. Evidence from previous studies in Kenyan public hospitals has revealed that the majority of women have experienced longer and more painful labour than anticipated. In addition, most women do not receive any childbirth education during the routine antenatal period [8]. A previous study carried out in a tertiary hospital in Kenya among healthcare workers revealed that the majority of the healthcare providers in maternal health had inadequate knowledge of labour pain management. Poor protocols and guidelines were also cited as health system barriers [9].

The antenatal educational program was effective in reducing pain, and anxiety, lowering caesarean births and improving self-efficacy among mothers in Korea, [5]. However, little is known about the impact of this program on childbirth in low and middle-income countries like Kenya. The knowledge gained in this study potentially provides information on how best to address the issue of intense pain in childbirth and reduce some of the morbidities like prolonged labours and increased maternal requests for caesarean birth for fear of extreme childbirth pain.

The self-efficacy theory

The theoretical model that underpin the development of this intervention was based on constructs from the self-efficacy theory of motivation that was invented by the psychologist Albert Bandura, [10]. He described self-efficacy as an individual's reliance on their competence to utilize authority not only over their behaviour but also over occurrences that influence their lives. An individual's sense of competency can give a foundation for inspiration, good health and personal achievements. Beliefs in an individual's self-efficacy originate from four main sources of guidance including experiences, verbal persuasion, role modelling and physiological feedback. The latter four were used as the basis for educational intervention.

Methodology
Study design

A quasi-experimental follow-up study design was utilised where eligible mothers were recruited at the antenatal care clinics in the

respective hospitals and followed up in the postnatal wards within 48 hours after delivery

Study area

The study was conducted in Kakamega County, Kenya. Data was collected at Kakamega County Referral Hospital (KCRH) a level 5 facility and at Butere, Malava, Iguhu, Makunga and Lumakanda health facilities which are categorized as level 4 in the Kenyan health facility categorization system.

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Study population

The study population consisted of pregnant mothers attending antenatal care services at KCRH, Butere, Malava, Iguhu, Makunga and Lumakanda facilities in Kakamega County Kenya. Mothers recruited for the study had to be free from pregnancy complications and other medical conditions such as diabetes, hypertension, pre-eclampsia, eclampsia, anaemia, oligohydramnios, polyhydramnios, or any related issues.
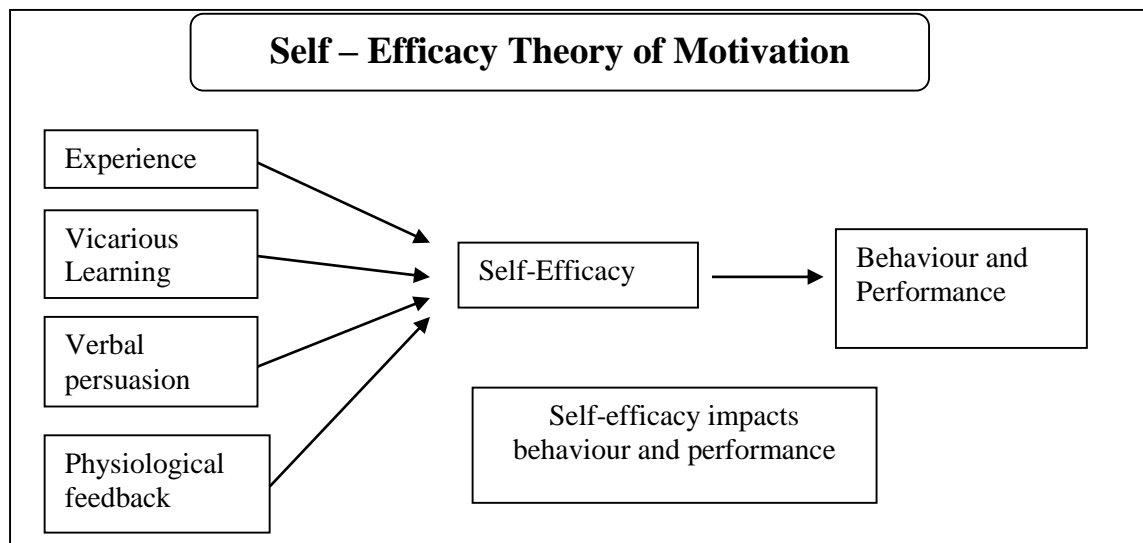

Figure 1:
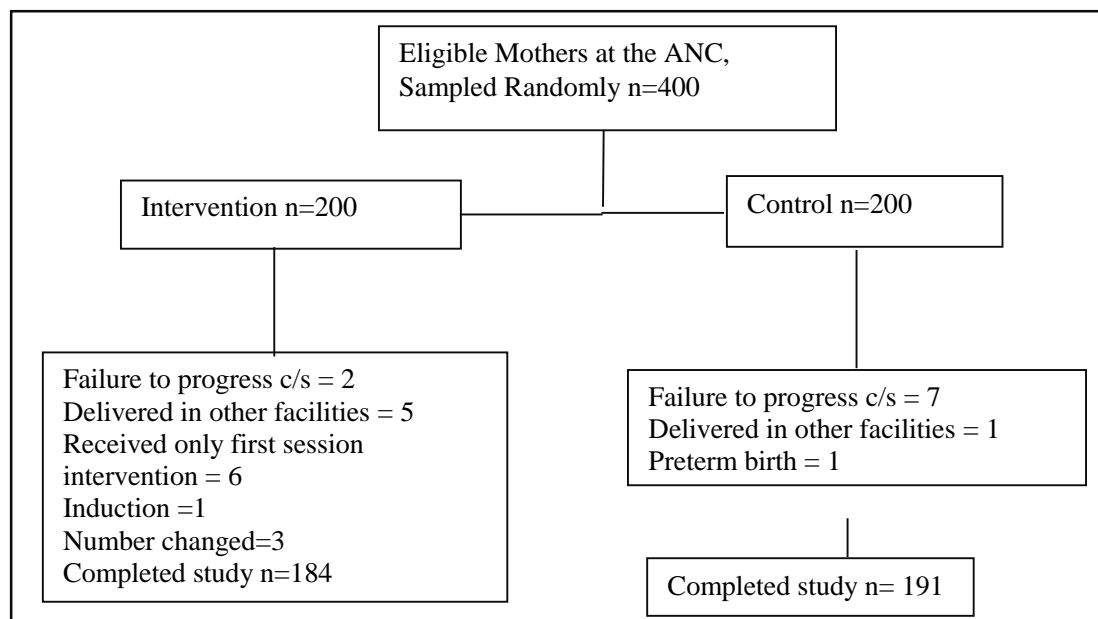Flowchart Showing the Self-Efficacy Theory [12]

Figure 2:
Flowchart Showing Recruitment of Pregnant Women to Intervention and Control Groups

Conducted in the third trimester, it was straightforward to verify these criteria from medical records. The participants were women whose birth plans aligned with the facility where they were receiving antenatal care. Eligible women were 18 years or older, with a singleton pregnancy, and between 28-34 weeks gestation, as the intervention was aimed at those nearing labour. Additionally, these women were expected to have a recommended mode of delivery as spontaneous vaginal delivery. Women who declined to participate were excluded from the study. Additionally, mothers who experienced complications leading to caesarean sections, and those who had adverse birth outcomes such as pre-term births, congenital birth defects, or fresh stillbirths were also excluded due to the emotional stress they were under.

Sample size determination

The sample size was determined using Fischer *et al*., 1998 formula. Utilization of hospital deliveries in Kakamega County is 70 %. Therefore, p=0.70. A total of 400 were arrived at with an added 20% of the sample to cater for the attrition rate.

Sampling technique

One County Referral Hospital was purposively selected and five level-4 health facilities were selected from the available 11 health facilities by a simple random sampling. The antenatal attendance register that contained maternal socio-demographics and gestational age was used to select eligible mothers. The enrolment of intervention and controls was done in alternate weeks until the required sample size was met in each facility. Half of the mothers were categorised as the intervention and the other half as the control group using a simple random sampling. The intervention and controls were separated by weeks to minimise the contamination effect. Mothers were contacted via their registered phone numbers and arrangements were made for in-person meetings. During these meetings, the purpose of the study was explained, and a thorough screening for eligibility criteria was conducted. Participants in each facility were grouped in numbers of 10-15 for easier follow-up based on their gestation period. The intervention group received two sessions of about 2 hours each of the educational intervention programs between the 32nd–35th weeks of gestation. All mothers were followed-up and evaluation on outcome measures was conducted within 48 hours after delivery.

Pretesting and training of research assistants

12 research assistants were recruited to help with data collection. Tools were pre-tested at Vihiga County Hospital using 15 mothers attending ANC and intrapartum services. Any anomalies of the instruments were revised and the time needed for each respondent was estimated. The reliability of the tools was assured by their use in China [11] and Saudi Arabia[12]and found to be reliable.

The intervention

The educational intervention programme purposed to increase self-efficacy among pregnant women, with the anticipation that they would successfully achieve behaviours for coping with stress and pain in childbirth. It comprised two sessions, each having 2 hours of interactive educational sessions. Each session was designed in groups of 10-15 mothers for enhanced interaction and discussion. Performance accomplishments, vicarious experience and verbal persuasion were utilised in the learning based on the self-efficacy theory by Bandura[12].

Day 1:

Activity 1: Increasing knowledge and motivating participants. Enhancing knowledge and inspiring participants to partake diligently in the process of childbirth preparedness was done. Childbirth was familiarised as a normal, natural, and healthy process and mothers were empowered to approach it with confidence. The information included; (labour pain and its causes, true signs and stages of labour and procedures to expect during childbirth). This was done using PowerPoint presentations, charts and pictures.

Activity 2: **Coping strategies and their demonstrations.** Coping behaviours were taught to include deep inhalation and relaxation techniques, distraction, cognitive restructuring of pain, walking, massage and prayer to help participants control emotional tensions and pain during labour. A demonstration of coping behaviours mentioned above was done. Expectant mothers were required to practice the learnt coping strategies.

Day 2:

Activity 3: Return demonstration. All participants were expected to practise the coping strategies and do a back demonstration of the learnt coping strategies.

Activity 4: Vicarious learning. The participants learnt through role models by visualizing a video. Two different expectant women demonstrated coping strategies for pain during the labour process.

Activity 5: Mastering of coping competencies. Pamphlets summarizing major coping strategies for directing self-rehearsals were given. A practical log for everyday recordings as a way of self-evaluating their positive result after practice in the belief that competence was achieved through arranged practice was encouraged.

Activity 6: Verbal persuasion. Participants were motivated and appraised for their continued practice. Group discussion on areas of concern during childbirth and sharing experiences of what to anticipate during the process of labour was enhanced.

The control group received usual routine antenatal care which did not have arranged educational childbirth classes. These mothers were followed up and thereafter comparisons were made between the two groups about the study objectives to determine the impact of the educational intervention program.

Data collection procedure and tools

Data was collected between December 2022 and April 2023. Structured questionnaires, the McGill pain questionnaire, and the Visual Analogue Scale for pain were utilised. The structured questionnaires were used to collect data on the socio-demographic characteristics of the participants. The Visual Analogue Scale (VAS) was utilized to evaluate the intensity of pain. On a scale of 0-10, mothers were to point and indicate the high-intensity pain experienced during labour. A range of 0-3 was categorised as mild pain, 4-6 moderate pain, 7-8 was severe pain and 9-10 was excruciating or unbearable pain. The McGill pain questionnaire also evaluated the intensity of pain among women. Women were required to describe their moment of high-intensity pain during labour, on a scale of 0-5 (No pain, painful, very painful, extremely painful and unbearable pain).

Data management and statistical analysis

Collected data was cleaned coded and entered into an Excel spreadsheet after which it was transferred into SPSS version 26. The means of the pain scores in the two groups were compared and a t-test was performed for statistical significance. Multivariate logistic regression was utilised to analyse factors associated with severe and unbearable pain.

Ethical considerations

Permission was sought from Masinde Muliro University of Science and Technology MMUST/IERC/104/2022, the National Commission for Science and Technology NACOSTI/P/22/21379), County Government of Kakamega and from the specific level four health facilities at the county. Informed consent was obtained from each study participant and all mothers received care from the clinics, their participation notwithstanding. Participant privacy and confidentiality of all data collected was strictly observed.

Results

Social demographic characteristics of the study participants

The socio-demographic characteristics of the study participants are summarized in Table 1. Three hundred and seventy-five mothers participated in the study (375), the median age was 24 years, the majority were

married (73.1%), Christians (93.9%), having attained secondary education (45.3%), unemployed (56.6%), attended more than four antenatal visits (79.2%), multi-para (52.2%) and had planned pregnancies (56.8%). There was no statistical difference between the intervention group and the control group, indicating that the groups were homogenous.

Effect of an educational intervention program on the intensity of childbirth pain

The Visual Analogue Scale (VAS) was utilized to evaluate the intensity of pain among the two groups of women, those who went through normal antenatal care plus an educational intervention program and those in the control group who just received normal antenatal care. Table 2 shows the means of the two groups as compiled using the visual analogue scale. The group without the educational intervention program had a mean of 9.03(0.77) interpreted as excruciating or unbearable pain compared to a mean of 7.53(0.77) in the intervention group, interpreted as severe pain, $P<0.001$. Mothers in the intervention group experienced lesser pain compared to those in the control group.

Table 1:
Socio-Demographic Characteristics of the Study Participants

	Study Groups		
Parameter	No intervention	Intervention	*P* value
Age Median (IQR)	24.00 (8)	25.00 (9)	0.113[a]
Marital status			
Single: n (%)	54(28.3)	44(23.9)	
Married: n (%)	137(71.7)	137(74.5)	
Separated: n (%)	0 (0)	3(1.6)	0.143[b]
Divorced: n (%)	0(0)	0(0)	
Widowed: n (%)	0(0)	0(0)	
Religion			
Christian; n (%)	176 (92.1)	176 (95.7)	
Muslin; n (%)	15 (7.9)	7 (3.5)	0.151[b]
Hindu; n (%)	0 (0)	1 (0.5)	
Others; n (%)	0 (0)	0 (0)	
Education level			
None; n (%)	0(0)	4 (2.2)	
Primary; n (%)	58(30.4)	52 (28.2)	0.100[b]
Secondary; n (%)	92 (48.2)	78 (42.4)	
Tertiary; n (%)	41 (21.5)	50 (27.2)	
Employment status			
Student; n (%)	29 (15.2)	23 (12.5)	
Not employed; n (%)	107 (56)	105 (57.1)	
Casual; n (%)	14 (7.3)	10 (5.4)	0.628[b]
Permanent; n (%)	4 (2.1)	8 (4.3)	
Self-employed; n (%)	37 (19.4)	38 (20.7)	
No. of ANC visits			
Less than 4; n (%)	39 (20.4)	39(21.2)	0.853[b]
Four and above; n (%)	152(79.6)	145 (78.8)	
Parity			
Primi–para; n (%)	75 (39.3)	73 (39.7)	
Multi-para; n (%)	100 (52.4)	96 (52.2)	0.995[b]
Grand multi-para;n (%)	16 (8.4)	15 (8.2)	
Pregnancy planning			
Planned; n (%)	104 (54.5)	109(59.2%)	0.349[b]
Not planned; n (%)	87 (45.5)	75 (40.8%)	

Data presented as n (%) unless otherwise stated. [a]Statistical difference determined by Mann-Whitney tests; [b]Statistical significance determined by Pearson Chi-Square tests.

To validate the above observations, further assessment of pain intensity using the McGill pain questionnaire was done. The results show that those mothers who did not have an educational intervention program had a mean score of 4.33(0.043) indicating extremely painful and excruciating pain. Those who went through an educational intervention program had a mean of 3.88(0.48) indicating very painful pain, $P<0.001$, suggesting a significant relationship between the educational intervention program and the perceived strength of pain.

Further analysis of the factors associated with severe pain and/or unbearable pain is presented in Table 3 from the visual analogue scale. These analyses revealed that the non-intervention increased severe pain [OR=3.099, 95% CI (1.080-8.887), $P=0.035$], and unbearable pain [OR=27.930, 95%CI (9.354-83.399), $P=<0001$], while permanent employment was associated with reduced unbearable pain [OR=0.038 95% CI (0.003-0.549), $P=0.016$].

Discussion

The current study established that mothers who undertook an educational intervention program experienced lesser pain as revealed by both the visual analogue scale and the McGill pain questionnaire compared to those who did not go through the intervention.

Table 2:
Effects of education intervention on intensity of childbirth pain

Parameter	No intervention	Intervention	*P* value
Visual pain	9.03 (0.077)	7.53 (0.077)	<0.001
Pain strength	4.33 (0.043)	3.88 (0.48)	<0.001

Data presented as mean (std error of the mean). Statistical significance was determined by independent t-tests.

Table 3:
Factors Associated with severe and unbearable pain on the visual analogue scale

	Factor	Odds ratio	95% CI	*P* value
Severe Pain	No intervention	3.099	1.080-8.887	0.035
	Primi para	1.023	0.146-7.148	0.982
	Multi para	1.565	0.354-6.920	0.555
	ANC visit <4 visits	0.993	0.373-2.638	0.988
Occupation	Student	2.085	0.432-10.049	0.360
	Unemployed	1.694	0.607-4.723	0.314
	Casual labourer	0.643	0.117-3.543	0.612
	Permanent employment	0.480	0.088-2.626	0.397
Education level	No education	0.438	0.026-7.434	0.568
	Primary	0.670	0.190-2.359	0.533
	Secondary	1.137	0.353-3.655	
Unbearable Pain	No intervention	27.930	9.354-83.399	<0001
	Primi para	1.253	0.148-10.604	0.836
	Multi para	0.950	0.183-4.939	0.951
	ANC visit <4 visits	0.993	0.346-2.851	0.989
Occupation	Student	0.625	0.116-3.363	0.584
	Unemployed	2.241	0.732-6.859	0.157
	Casual labourer	1.407	0.230-8.600	0.711
	Permanent employment	0.038	0.003-0.549	0.016
Education level	No education	0.580	0.024-13.947	0.737
	Primary	0.313	0.081-1.214	0.093
	Secondary	0.715	0.209-2.444	0.593

Data are presented as odd ratios (OR) and 95% confidence interval (CI) determined by multinomial logistic regression analyses.

This could be attributed to the fact mothers in the intervention group were more knowledgeable about the childbirth process and practised various non-pharmacological methods of pain relief compared to their counterparts. The intervention imparted knowledge on childbirth and the performance of various non-pharmacological ways of pain relief. In addition, uncertainties, fear and anxiety were addressed by the intervention. These results corroborate the findings of a study conducted in China among first-time mothers that proved an educational intervention program was more effective in increasing pain threshold among mothers who went through the educational intervention program than those in the control group during the early and middle stages of labour[11]. Comparatively, Mindfulness Childbirth Education in the United States had a positive impact on pain reduction in labour and less use of pharmacological agents [6]. In the current study, however, the use of pharmacological agents was not evaluated since it is hardly used unlike in the former study where most mothers request pharmacological agents in labour.

Pain strength was evaluated using the McGill pain questionnaire, the results reveal that those who were in the intervention group described their strength of pain from painful to very painful compared to those in the control group who received standard care and described their strength from very painful to unbearable pain. This may be because those who underwent the intervention program were psychologically prepared for pain as part of the delivery process, viewing it as necessary and beneficial since it leads to the birth of the baby. Mothers in the intervention group had also practised various methods of pain relief which they could have utilised and therefore perceived their strength to be lower than their counterparts who may have viewed pain as pathological and destroying and had fewer methods of coping with pain. Our results compare with those of studies done in Ethiopia where a high level of knowledge on the procedures of labour and childbirth was associated with decreased

negative emotions and a reduction in experienced pain [13]. Furthermore, the support for childbirth education has also been fronted by former authors who revealed that motivated and relaxed women experienced less intense pain [5]. Previous studies done in the Kenyan context have revealed that most women are anxious, lack knowledge of the birthing process and ways of coping with pain hence experience high-intensity pain [8, 14]. This is a plausible explanation as to why the control group experienced high-intensity pain both on the visual analogue scale and the McGill pain questionnaire.

The outstanding factor in this study that influenced the perception of severe and unbearable pain was being in the control group. Mothers in the control group did not receive any organised lessons to increase their knowledge of childbirth and demonstrate coping mechanisms before labour. It is also assumed that they were more anxious and fearful compared to their counterparts in the intervention group who were taught otherwise. Contrary to these findings, Kuciel and colleagues [15] in Finland noted that attendance at pregnancy classes did not affect pain perception, they had a lower number of women attending a pregnancy course this may not have yielded a significant difference in pain perception since it was during COVID-19 pandemic period. Unlike in this current study where majority of mothers were recruited into the program and therefore the results were significant. This implies that the educational intervention program was effective in equipping mothers with the necessary knowledge on childbirth and coping skills that resulted in reduced pain intensity during childbirth.

In pregnancy and labour, identified factors such as complicated pregnancy, parity, inadequate knowledge, bad incidents of earlier pregnancies, motivation, satisfaction composure and general anxiety as factors that can impart variability in the magnitude and quality of experienced pain [16]. This study also explored the socio-demographic factors

and pain perception. Parity was another factor of importance that influenced the perception of pain in the current study, multi-paras were more likely to experience severe pain compared to the primigravidas, on the contrary, the primigravidas had an increased chance of experiencing unbearable pain compared to the multi-paras, the difference in the intensities of pain disregarding the intervention could be attributed to the fact that multi-paras had prior experience and may have been more confident compared to the first time mothers. However, there was no statistical significance on the influence of parity and experience of pain. These results compare with those in Iran where parity and the presence of a partner did not affect pain perception [4].

Attendance of antenatal care visits was not a predictor of pain perception in the current study, this could be attributed to the fact that most mothers who visited antenatal care clinics were not taught adequately about childbirth issues and therefore lacked knowledge on pain management and related issues in childbirth. Comparatively previous findings in the Kenyan setting indicate that most women do not receive any childbirth education during the routine antenatal period. The majority of women did not practice any methods of pain relief and healthcare providers left them to labour naturally [17]. Similar findings were reported by former researchers in England who found that most women who attended antenatal care were still uncertain about many aspects of labour and pregnancy. Women wanted reassurance and preparation for childbirth including pain management. They alluded that healthcare providers spent little time with them without practising any of the methods of pain relief and consequently, they were not in control during labour [18].

Occupation in the current study had a significant influence on severe pain and unbearable pain. Mothers who were students and the unemployed category had increased chances of experiencing severe and unbearable pain. This could be attributed to the fact that they were more anxious and worried about

infant care, especially the students, the unemployed may have worried about the needs of the infant as evidence has shown that fear and worry are linked to high intense pain [19]. The permanently employed were less likely to experience the unbearable pain. This can be assumed that income influences accessibility to information, therefore they were better informed about the birthing process and procedures. Another explanation could be those who had permanent employment had a steady source of income and therefore were not worried about the needs of the baby as they could afford them compared to those who did not have a steady income and were worried about the multiple needs of the new baby. Relaxation and self-confidence have been associated with low-intense pain [20].

Lastly, on the education status, mothers who had a higher level of education were more likely to experience severe and unbearable pain. This could be attributed to the fact that educated mothers have a lot of expectations including interventions such as pharmacological pain relief. A study done in England confirmed that level of education and occupation are some of the socio-demographics whose influence has not been fully established since pain perception among women may be inclined more to their state of overall self-confidence, their current coping strategies and firm backing role models. Additionally, internal individual factors may be more convincing than women's demographic factors acquainted with the earlier evidence that pregnancy anxiety was firmly linked with increased childbirth pain [19]

Conclusion

The educational intervention program significantly reduced childbirth pain perception in the intervention group compared to the control group.

Recommendations

The study recommends that an educational intervention program should be incorporated into antenatal care specifically in the third trimester to prepare mothers adequately for the adverse process of labour by

increasing their knowledge, and coping mechanisms for childbirth pain and improving their psychological status before labour.

Future research on some socio-demographics like education level and pain perception should be undertaken since mothers who had higher education levels were more likely to have severe and unbearable pain.

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