Original Research

Volume 06, Issue 01, pp 76-86, May, 2024

ACHIEVERS JOURNAL OF SCIENTIFIC RESEARCH

Open Access Publications of Achievers University, Owo

Available Online at *www.achieversjournalofscience.org*

Effect of Education Program on Thermal care of Pregnant Adolescents Attending Antenatal Clinic at Primary Healthcare Centers in Zaria Metropolis, Nigeria.

[1]Abdulraheem, A., [2]Gommaa, H., [2]Musa-Maliki, A.U., [2]Musa, H.A., [1]Tukur, B.M. and [1]Haruna, H.

[1]Department of Nursing Science, College of Medical Sciences, University of Maiduguri, Borno.
[2]Department of Nursing Science, College of Medical Sciences, Ahmadu Bello University, Zaria.

Corresponding author: aminaabdulraheem@unimaid.edu.ng

Submitted: March, 12, 2024, Revised: April 26, 2024, Accepted: May 4, 2024, Published: May 8, 2024

Abstract

Hypothermia is known to be a major cause of neonatal mortality as it complicates other conditions like asphyxia, prematurity at early neonatal period. Pregnant adolescents are at high risk of having preterm birth, low-birth-weight babies and sub optimal thermal care practices. The study aimed to evaluate the effect of nursing intervention program on thermal care of pregnant adolescents attending antenatal clinic in Zaria metropolis. It a quasi-experimental design using a multistage sampling technique to obtain data from 302 adolescent mothers; assigned to the study and control groups; 151 participants to each group. Data were collected using structured and validated interviewer-administered questionnaire and observation checklist before and after the intervention. Descriptive statistics of mean and standard deviation were presented on frequency/percentage tables while inferential statistics was used in the form of chi-square and t-test to evaluate the effect and the trends of the effect. At pretest, no statistically significant difference in the pretest mean knowledge (p-value = 0.504) scores of mothers between the study and control groups. At post-tests, the mean knowledge and practice scores of mothers in study group improved significantly (P value < 0.05) at first week, 6th week, 10th week, 14th week and 6th month postpartum. Mothers in intervention group were more satisfied with their role of thermal care than those in control group (p-value <0.001). Hence the need for nurses and midwives to continue training pregnant adolescents on thermal care.

Keywords: Education program, pregnant adolescent, primary healthcare centers, Thermal care

1.0 Introduction

Neonatal hypothermia is a major global health challenge and an important risk factor for neonatal mortality with higher prevalence in developing countries (Beletew *et al.*, 2020). Hypothermia is rarely a direct cause of neonatal mortality but complicates other conditions at early neonatal period (Yitayew *et al.*, 2020). Neonatal hypothermia is when newborn's body temperature falls below lower limit of normal range of 36.5–37.5 °C. The severity may range from mild cold stress when the temperature is 36–36.4˚C, moderate with temperature of 32–35.9˚C to severe with body temperature of less than 32˚C. Newborns are at greater risk of developing hypothermia because they cannot regulate their body temperature without external thermal protections such as skin-to-skin contact with the mother immediately after birth, initiation of breastfeeding within one hour of birth, delay first bath till after 24 hours of birth and adequate clothing (Bayih *et al.*, 2019). Immature thermal regulation conditions such as low birth weight, prematurity, asphyxia,

intrauterine growth restriction are associated with hypothermia (Demitse *et al*., 2020). Neonatal hypothermia is associated with up to five-fold higher mortality in the first week of life with varying prevalence in hospital and home settings from 32 to 85% and from 11 to 92% respectively (Beletew *et al.,* 2020). Their increased risk of hypothermia is due to physical and environmental factors. Physical factors that make newborns to be susceptible to hypothermia include a large surface area to volume ratio, thin skin and lower insulating fat (Mukunya *et al.,* 2021) while the environmental factors are poor thermal care practices around the time of delivery, such as keeping the newborn away from the mother and bathing within 24 hours of birth (Pisoni *et al.,* 2022). WHO (1997) recommends a 10-step warm chain to prevent neonatal hypothermia which include: a warm delivery room, immediate drying, delayed bathing till after 24 hours of delivery, skin-to-skin contact, early and exclusive breast feeding, appropriate clothing/bedding, keeping the baby with the mother, warm transportation and resuscitation, and training/raising awareness on the dangers of hypothermia. These practices have great potential of promoting neonatal survival and development, for instance mothers who practice skin-to-skin contact are more likely to initiate breastfeeding within one hour of birth and exclusively for up to six months after birth, the infants have higher stability of the cardio-respiratory system, and higher blood glucose levels (Almgren, 2018).

Sub-optimal neonatal thermal care practices around the birth time are common practices among adolescent mothers, probably due to their lack of experience and knowledge of the recommended optimal thermal protection practices ((Demissie *et al.,* 2018; Kabwijamuydia *et al*., 2016); meanwhile adolescent pregnancy is associated with higher risks of having preterm births, low-birth weight infants and stillbirths compared to older mothers (Perez *et al.,* 2020). This may also be complicated by a common cultural behavior called 'kunyan' meaning 'shyness' in the current study area in which first-time mothers are expected to exhibit a high degree of shyness when caring and interacting with their infants.

Additionally, Kaduna state is one of the North-Western Nigeria states with a high prevalence (522/1000 women) of adolescent mothers occurring mostly within marriage and in male-led households (Akombi-inyang *et al.,* 2022; Nigeria Demographic and Health Survey, 2018). Furthermore, mothers' satisfaction with the thermal care role is an important factor determining competence in the role. Attainment of competence in the knowledge and practice can enhance a sense of satisfaction in role behavior; in other words, competence and satisfaction in role behavior complements each other. Factors such as high satisfaction with marriage and support during the antenatal period are most likely to result to a higher level of role satisfaction during postpartum period, and a high level of role satisfaction are in turn predictive of optimal and sensitive practice (Qi *et al.,* 2022). The need for behavioral and cultural modifications through professional health educational program can assist adolescent mothers to adopt optimal thermal care practices. Nurses/midwives have responsibilities in helping them through this stage by training and health education. This will help in promoting infant health and a move towards attainment of sustainable development goal, thus the need to assess the effect of nursing educational program on thermal care of adolescent mothers in the study area.

2.0 Material and methods

2.1 Design

The study is a quasi-experimental study design that adopted controlled interrupted time series (CITS), approach. CITS design involves a set of observations on a population, taken repeatedly over time before and after an intervention to evaluate the impact and sustainability of the intervention (Ewusie *et al.,* 2017). The design therefore allows for the evaluation of maternal knowledge and practice of thermal care from third trimester of pregnancy through their various postpartum visits to PHCs for immunization up to sixth month postpartum.

2.2 Target population

The target population for this study were pregnant adolescents who received antenatal care at PHCs in Zaria Metropolis during the study period. It extends and covers the women and their infants up to sixth month postpartum. They were 1,230 in number, 613 for study and 617 for control group (Medical Record in each PHC, 2020).

Table 1: Target population of the studied groups

Study group			Control group		
PHC	Pregnant adolescent on ANC	Sample size	PHC	Pregnant adolescent on ANC	Sample size
Samaru	156	39	Kwata	218	54
Jama'ah, zango	37	09	Unguwan Dankali	33	08
Chikaji	26	06	Unguwan Alkali	38	09
Abdu Kwari	36	09	Babbandodo	279	68
Tudun-wada	358	88	Rimin Doko	49	12
Total	**613**	**151**		**617**	**151**

Sample size and sampling technique

The sample size of 302 participants; 151 to each group was determined by using the Colton, (1974); and Daly *et al*. (1991)'s formula for comparison of two independent populations.

$$n = \left\{\frac{2(Z\alpha + Z\beta)\sigma}{u_1 - u_L}\right\}^2 \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \text{(i)}$$

Parameters are:

n = minimum required sample size per each group

σ = estimated population standard deviation = 3

u1= population mean of study group = 16.3

u2 = population mean of control group = 15.28

u1-u2 = Difference between the two population means = 1.02

Zα = Standard z- value at the desired level of significant = 1.96 at 5% level of significant

Zβ = Standard z- value at the desired power = 0.84 at 80% power

$$n = \left\{\frac{2(1.96 + 0.84)3}{1.02}\right\}^2 .$$

$$\frac{141.12}{1.0404}$$

= 135.6401

n = 136 per group

Jain, Gupta and Deshraj (2015), stated that 10-20% subjects are required to allow for adjustment of other factors such as withdrawals, missing data, lost to follow-up from the study. Based on previous work from similar intervention study, the researcher expects that 10% of all the participants would be lost to follow-up or would drop out of the study. The attrition rate was calculated using the formula below:

Number to enroll x % retained = desire sample size

$$no\ of\ enroll = \frac{desired\ sample\ size}{\%\ retained} \ldots\ldots(ii)$$

Number to enroll = $\frac{136}{0.9}$

= 151 per group

Therefore, the total sample size with 10% attrition rate was determined to be 302 for both study and control groups.
The proportionate sample size per facility was determined using:
Nth =

$$\frac{Nth}{Ntotal}\ x\ total\ sample\ size\ \ldots\ldots\ldots\ldots\ldots(iii)$$

Where, nth = sample size per facility
Nth = population size per facility
Ntotal = total population size

Multistage sampling technique was used. Stage 1: Zaria metropolis was stratified into Zaria and Sabon Gari LGAs. There was a total of 23 (10 from Sabon Gari LGA and 13 from Zaria LGA) functional PHCs that offer comprehensive maternal and child healthcare (MCH) services at the time of the study. Stage 2: five PHCs were randomly selected from each Sabon and Zaria LGAs for study and control groups by simple random sampling technique (balloting). Stage 3: a proportional allocation of participants needed per PHC was done based on the average number of clients that attend antenatal clinic weekly. Stage 4: systematic sampling technique was used to select the required respondents in each PHC; this was done by selecting every n_{th} respondent from target population frame in each antenatal clinic. The n_{th} (sampling interval) respondent was gotten by dividing the target population by the sample size.

2.3 Method of data collection

The data collection process was arranged in three phases as: pre-intervention, intervention and post-intervention.

2.3.1 Pre-intervention*:* Educational materials (leaflets) containing main points of instructions on the program and research instruments were prepared. The same was independently translated into Hausa language for adequate and correct communication. Each PHC was visited, the aim of the study was explained to their unit heads and agreement was made on when to come for the program. Four nursing students and two nurses/midwives/experienced CHEW/CHO from each PHC were trained as research assistants for this study. The formal (i.e. four nursing students) were part-three nursing students from ABUTH School of nursing and were used throughout the pre-intervention data collections and administration of interventions in the PHCs. The latter (i.e. two nurses/midwives/experienced CHEW/CHO) were from each PHC and were used throughout post-intervention data collection. The researcher and the research assistants were introduced to the respondents, explained the aim of the study and obtained their informed consents to participate. All research assistants were taught on how to administer each question of the instruments in both English and Hausa. All research assistants were also given Open Data Kit (ODK) software application into their mobile phones as instruments for data collection. Interview were mainly conducted in Hausa language except very few who didn't understand Hausa that were interviewed in English language. Baseline (pre-intervention) data were collected from both study and control groups. Participants included in the study were in at least 24th week of gestation. Data collection process was carried out sequentially from all the PHCs within three weeks based on their days of ANC visit. At each visit, all eligible participants in both study and control groups were interviewed with the questionnaire to assess and evaluate their baseline knowledge of thermal care. Baseline (pre-intervention) data collection per each participant took about 30 minutes, a period of 20 days was used to collect the baseline data from all the selected PHCs.

2.3.2 Intervention*:* The intervention was given to the study group in a well-ventilated and comfortable room in each PHC during their visits to the routine ANC; it was given in addition to the routine antenatal care. The intervention was conducted in two sessions: The first session involved the introduction and description of details about thermal care including: definition of thermal care, thermal care to render immediately after bath, appropriate time of first bath, benefits of infant thermal care, measures to achieve infant thermal care, causes of hypothermia etc. This was presented with the aid of audio-visuals materials like slides, videotapes, flip charts and leaflets. The first session took a period of 40 minutes. The second session was conducted to demonstrate to the mothers on how to carry out all the procedures related to thermal care. Doll models (of infant well-dressed

with cloth, cap, socks and wrapped with flannel) were used in the demonstration. Each of the mothers took a turn to demonstrate and pamphlets were given to them. This took a period of 60 minutes. The interval between the two sessions was fifteen minutes. All mothers in the study group were given educational materials (leaflets) after the training, these contained main points of instructions of the program and diagrams. Telephone followed-up calls where necessary to clarify doubts and issues. Mothers in control group were only exposed to routine antenatal care. PHCs of study group were visited for the interventions weekly in sequential manner based on their ANC days until all were covered.

2.3.3 Post-intervention*:* CITS design was used to determine the effect of nursing educational program on knowledge, practice and satisfaction of the participants. This involved assessment and evaluation of the effect of the intervention on both groups at various stages from first week to sixth month postpartum; at 1st week, 6th week, 10th week, 14th week and at 6th month postpartum. Posttest data collection was in five-time series as follows: at first week during BCG immunization, 6th week during Penta 1, 10th week at Penta 2, 14th week at Penta 3 and at 6th month postpartum during measles/Vitamin A immunization. Posttest data was collected by the two trained nurses/midwives/experienced CHEW/CHO from each PHC. The data were collected from mothers individually based on their time of delivery and days of immunization visits. This phase took place in each PHC during immunization visits at first, sixth, tenth, fourteenth weeks and at sixth month postpartum. Post-test data on knowledge and satisfaction were collected using the same interviewer-administered questionnaire used during pre-test data while observation checklist was used for practice. Post-test data collection covered both study and control groups. All data were collected using the ODK and were sent to the cloud where it was collated for analysis. The data collection process lasted for 12 months, June 2020 to May 2021.

2.4 Method of data analysis

Data were analyzed descriptively and inferentially as appropriate using Microsoft Excel and IBM SPSS (version 22) statistical packages. Frequencies, percentages, mean and standard deviation were used to describe respondents' demographic characteristics and the results were presented in tables. Correlation was used to test the relationship between thermal care practice and certain socio-demographic variables. Independent sample t-test was used to test the effect and trend of the effect of the program up to sixth month postpartum.

2.5 Ethical clearance

The ethical approval to conduct the research obtained from Ahmadu Bello University with reference number: VC/SAD/STU/32 and Kaduna State ministry of health with reference number: MOH/ADM/744/VOL.1/920. Permission from supervising heads of PHCs and individual participant's informed consents obtained before data collection. Mothers assured with the use of informed consent forms that the research would pose no risk or hazard to them and their infants; and their participation in the research was voluntary as they could withdraw from it at any time if they wish.

3.0 RESULTS AND DISCUSSION

Table 2 presents the socio-demographic characteristics of 302 respondents who participated in the study. The finding showed no statistically significant difference in most socio-demographic characteristics between the study and control groups except in occupation where more women in control group (70.20%) than the study group (53.64%) (P=0.008) are not working; this confirmed the homogeneity of the groups. The implication of disparity in their occupational status is that women with low income as a result of unemployment are likely to demonstrate poor practice of thermal care; this was based on the finding of the current study (Table 5) in which there was statistically significant relationship between thermal care practice and maternal income. Their age ranged from 15 to 19 years, with a mean age of 17.93 ± 1.63 years and 17.95 ± 1.61 years for the study and control groups respectively. The respondents were predominantly Hausa (p-value = 0.165) and of Islam faith (p-value = 0.562). Majority (99.34% for study and 98.68% for control groups) (p-value =0.562) are married. Their average monthly earnings are about #4000 for study and #6000 for control groups (p-value = 0.850). So also, educational attainment is similar

between the groups (p-value = 0.952) in which some (47.68% and 43.71%) in study and control groups respectively completed primary education, 25.17% in both groups completed secondary education and (17.22% and 19.87%) in study and control groups respectively attended only Quranic education, meanwhile 8.61% and 9.93% in study and control groups respectively had no formal education.

This study provides holistic picture showing the effect of nursing education program on thermal care knowledge, practice and satisfaction of adolescent mothers which gave evidence-based information on how to achieve SDG 3 related to newborn health and survival in Zaria town, Kaduna state. Attainment of thermal care competence among adolescent mothers has a lot of gaps (Kabwijamuydia, *et al.*, 2016), so there is need for improvement by providing adequate health education for the adolescent mothers during antenatal care. Therefore, through this study, the researcher evaluated the effect of nursing educational program on thermal care of adolescent mothers.

Table 3 presents the knowledge of thermal care of the studied groups before and after the intervention program. The aggregate mean scores of study and control groups before the intervention are 2.1192±1.28 and 2.0199±1.30 with t-test and P-values of 0.669 and 0.504 respectively. This implies that no statistically significant difference in the knowledge of the studied groups before the intervention. However, after the intervention, the aggregate mean scores of study and control groups are 5.6618±0.733 and 2.7941±1.187 with t-test and P-values of 23.975 and <0.001 respectively. This implies there is statistically significant difference in the knowledge of the studied groups after the intervention. To start with, the knowledge and practice of neonatal thermal care among young mothers are of optimal importance as neonates are easily susceptible to hypothermia due to their thin skin, a large body surface area, low insulating fat and easily overwhelmed thermoregulatory mechanisms. Hypothermia predisposes neonates to hypoglycemia, hypoxia and metabolic acidosis which may result in neonatal morbidity and mortality (Ting *et al*., 2018). Educating adolescent mothers on knowledge and practice of thermal care is crucial due to their lack of experience and knowledge of the recommended optimal thermal protection practices (Demissie *et al*., 2018; Kabwijamuydia *et al*., 2016). The finding of this study revealed the higher mean scores of knowledge among the respondents in the study group throughout the stages of posttest compared to pretest in both groups and posttest in control group. This could be attributed to the sufficient information gained from the health educational program; therefore, the program has greatly impacted in improving the knowledge of thermal care among the respondents. This finding is similar to the result of a descriptive study in Nigeria by Olawuyi *et al*., (2021) where mothers showed good knowledge of Kangaroo mother care (KMC); although it was descriptive survey, the reason for the good knowledge might be due to the fact that the study was conducted a center designated as a center of excellence for KMC by Federal Ministry of Health due of its dedication and training of neonatal intensive care unit mothers on KMC. The result of the current study is also consistent with a quasi-experimental study in Egypt by Ali Abd El-Salam *et al*., (2019) and that of Nasir *et al*., (2017) in Indonesia who reported statistical significant improvement of mothers' knowledge of thermal care at posttest. The implication of this finding was that improved knowledge of infant thermal care among adolescent mothers is a great achievement for improving infant survival and wellbeing which could help in the attainment of child-related sustainable development goal 2030.

Figure 1 presents the line chart showing the effect of the intervention on knowledge over six months postpartum. Both the study and control groups have almost the same baseline mean knowledge before the intervention. After the intervention, there was a great increase in the knowledge in the study group which was steady throughout the period of observation except a slight decline from 14th week to 6th month postpartum. However, for control group there was a slight and gradual increase in knowledge which was maintained till the end of the

observation and also experienced a slight decline from 14th week to 6th month postpartum.

Table 2: Distribution of Socio-demographic characteristics of the studied groups

Item	Study (n= 151)		Control (n = 151)		Test
	F	%	F	%	
Age group (years)					
15 -17 (middle adolescent)	49	32.45	52	34.44	$X^2 = 0.134$
18-19 (late adolescent)	102	67.55	99	65.56	P = 0.714
Mean age	17.93 ± 1.63 years		17.95 ± 1.61 years		
Ethnic group					
Hausa	139	92.05	144	95.36	$X^2 = 5.088$
Fulani	6	3.97	6	3.97	P= 0.165
Yoruba	1	0.66	1	0.66	
Others	5	3.30	-	-	
Religion					
Islam	149	98.68	150	99.34	$X^2 = 0.337$
Christianity	2	1.32	1	0.66	
					P = 0.562
Marital status					$X^2 = 0.337$
Married	150	99.34	149	98.68	
Single	1	0.66	2	1.32	P = 0.562
Major occupation					
Petty trading	49	32.45	36	23.84	$X^2 = 11.792$
Tailoring/hair dressing	17	11.26	9	5.96	
Teaching	4	2.65	-	-	P = 0.008*
Not working	81	53.64	106	70.20	
Monthly earnings					X^2 =0.036
N1000 -N5000	63	90.00	40	88.89	
N6000 -N10000	7	10.00	5	11.11	P = 0.850
Parity					
Nulliparity	111	73.51	109	72.19	
Para-one	26	17.22	31	20.53	$X^2 = 3.012$
Para-two	11	7.28	7	4.64	P = 0.556
Para-three	2	1.32	4	2.65	
Greater than three	1	0.66	-	-	
Highest education attained					$X^2 = 0.689$
Tertiary education completed	2	1.32	2	1.32	P = 0.952
Secondary education completed	38	25.17	38	25.17	
Primary education completed	72	47.68	66	43.71	
Quranic education	26	17.22	30	19.87	
No formal education	13	8.61	15	9.93	

*** Denotes statistically significant difference**

Table 3: Knowledge of thermal care before and after the intervention

Knowledge of thermal care	Before		After	
	Study (n =151)	Control (n =151)	Study (n= 136)	Control (n= 136)
Mean±SD	2.1192±1.28	2.0199±1.30	5.6618±0.733	2.7941±1.187
t-value	0.669		23.975	
P-value	0.504		<0.001	

By implication, the intervention program has greatly improved and sustained the knowledge over a long period of time; the decline at the later stage of the observations confirms the nature of human being of their possibility of experiencing extinction in knowledge after some period of time which now give room for continuous health education of mothers. The result also implied that even in the subsequent deliveries of the respondents in the study group, there is high tendency that they would still have good knowledge which will only need to be updated through continuous health education. Part of the strength of this design is that it has the ability to distinguish the impact of the intervention from the secular trend, that is the change that would occur even in the absence of the intervention; which can be observed from the groups in which there are some levels of knowledge increase that was observed in the control group which was slight and minimal compared to the study group which was high.

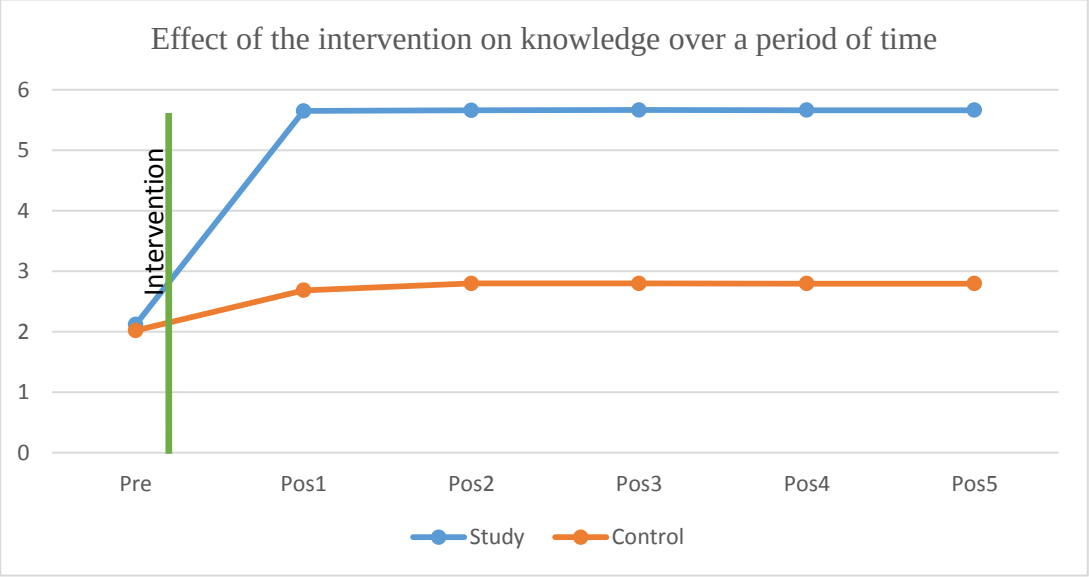

Figure 1: line chart showing effect of the intervention on knowledge over six months postpartum

Table 4 presents the practice of thermal care of the studied groups after the intervention. The aggregate mean scores of study and control groups are 8.4118±0.694 and 6.2059±0.406 with t-test and P-values of 32.012 and <0.001 respectively. This implies statistically significant difference in the practice of the studied groups after the intervention. Findings of this study revealed improved thermal care practice in the study group and statistically significant difference between the study and control groups throughout the stages of posttest observations. By implication, the program has really improved the practice of adolescent mothers on infant thermal care; as such more infants of these high-risk mothers would be protected from hypothermia with associated hypoxia, metabolic acidosis and mortality. This finding is contrary to a cross sectional study conducted in Ethiopia by Wako *et al* (2022) who reported non-practice of skin-to-skin care and early bath of neonates and therefore recommends the need for interventions to train mothers on optimal neonatal thermal care. However, the result of the current study is similar to a quasi-experimental study conducted in Indonesia by Nasir *et al*., (2017) in which mothers in the study group showed improved thermal care practice after the educational intervention.

Table 4: Practice of thermal care after the intervention

Practice of thermal care	After Study (n=136)	Control (n=136)
Mean±SD	8.4118±0.694	6.2059±0.406
t-value	32.012	
P-value	<0.001	

Table 5 presents the relationship between thermal care practice and selected socio-demographic characteristics of the adolescent mothers. For educational level, the r-value is 0.688 with p-value of <0.001, which indicates statistically significant relationship between the thermal care practice and educational level of respondents. Also, for income the r-value is 0.664 with p-value of <0.001, this indicates statistically significant relationship between the thermal care practice and income of respondents. However, for parity, the r-value is 0.053 with p-value of 0.543 which implies no relationship between the thermal care practice and parity. The implication of disparity in their occupational status is that women with low income as a result of unemployment are likely to demonstrate poor practice of thermal care. Likewise, mothers with higher educational level are likely to demonstrate good thermal care practice.

Table 5: Relationship between thermal care practice and selected socio-demographic characteristics

Demographic characteristics	r-value	p-value
Educational level	0.688	<0.001
Income	0.664	<0.001
Parity	0.053	0.543

After the intervention, there was a great improvement in the practice in study group which was steady throughout the period of observation except a slight decline from 14th week to 6th month postpartum. However, for control group there was a slight and gradual increase in practice which also experienced a slight decline from 14th week and 6th month postpartum. By implication, the intervention program has really improved and sustained the optimal practice of thermal care among mothers in the study group over a long period of time. They have high tendency of maintaining the optimal practice in their subsequent deliveries only needed to be updated by continuous health education.

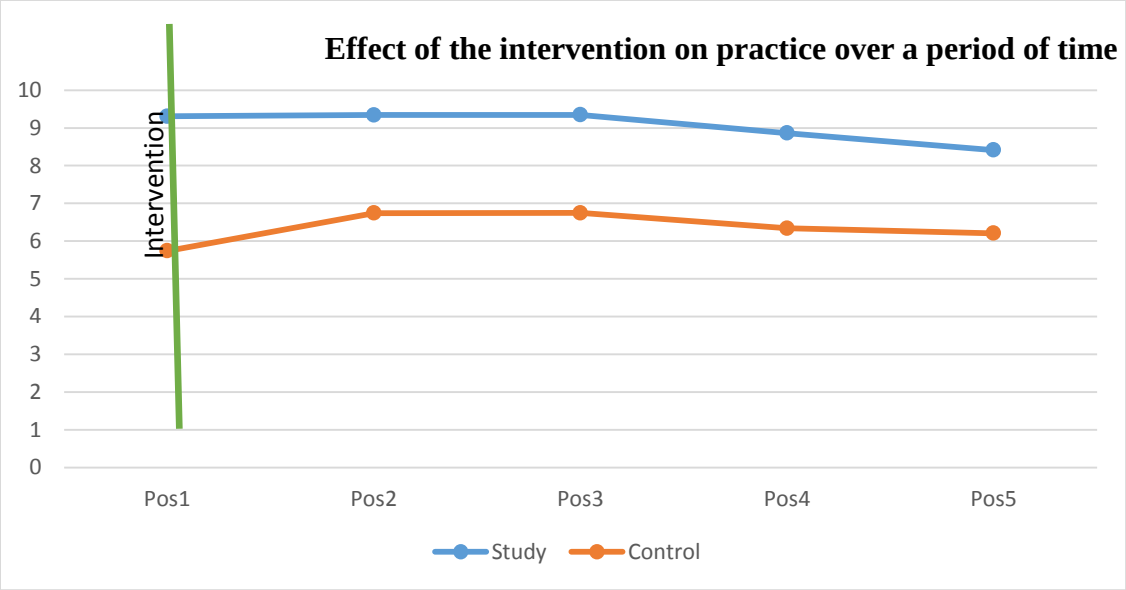

Figure 2: line chart showing effect of the intervention on practice over six months postpartum

Table 6 presents the satisfaction of the studied groups after the intervention. The aggregate mean scores of study and control groups are 14.5±0.807 and 10.7794±0.727 with t-test and P-values of 39.933 and <0.001 respectively. This implies statistically significant difference in the satisfaction of the studied groups after the intervention. Mothers in the study group were more satisfied with thermal care practice than in control group and statistically significant difference existed between the study and control groups at sixth month postpartum.

Table 6: Satisfaction of studied groups after the intervention

Satisfaction with thermal care	After Study (n=136)	Control (n=136)
Mean±SD	14.5000±0.807	10.7794±0.727
t-value	39.933	
P-value	<0.001	

4.CONCLUSION AND RECOMMENDATIONS

Pre-intervention knowledge of thermal care among adolescent mothers in Zaria Metropolis was generally poor probably due to their lack of experience and knowledge of the recommended optimal thermal protection practices. Adolescent mothers who were subjected to the educational program had improved knowledge, practice and satisfaction at the posttest than those in control group. Hence: technical training and health education of all pregnant adolescents by nurses/midwives on thermal care is imperative in order for these young mothers to attain competence in this aspect of their motherhood role. Training and supporting all nurses/midwives to provide healthcare services to adolescent mothers in a friendly and appropriate manner and modifying health facilities to respond to the needs expressed by adolescent mothers. This study showed that there is tendency for slight reduction in the knowledge of the study group, hence the need for continuous health education for all pregnant women to strengthen knowledge and practice in their subsequent childbirth. Furthermore, government should review policy around acceptance of adolescent mothers into schools for continuing education; this would enable them to be resourceful, gainfully employable and financially independent.

Conflict of interest

The authors declared that there is no conflict of interest

Acknowledgements

Appreciation to all the adolescent mothers and health professionals who participated in the study.

REFERENCES

Akombi-inyang, B. J., Woolley, E., Iheanacho, C.O. and Bayaraa, K. (2022). Regional Trends and Socioeconomic Predictors of Adolescent Pregnancy in Nigeria : A Nationwide Study *Int Journal Environ Res Public Health* 19(13):8222. https://doi:10.3390/ijerph19138222

Ali Abd El-Salam, A., Mohammed El-Maghawery Eldeeb, A., and Salah Eldin Mohamed Saleh, A. (2019). Effect of Instructional Program on Primipara Mothers' Knowledge Regarding Neonatal Care. *American Journal of Nursing Research*, *7*(3), 256–261. https://doi.org/10.12691/ajnr-7-3-4

Bayih, W. A., Assefa, N., Dheresa, M., Minuye, B. and Demis, S. (2019). Neonatal hypothermia and associated factors within six hours of delivery in eastern part of Ethiopia :a cross-sectional study. *BioMed Central Pedatrics* 19:252. https://doi.org/10.1186/s12887-019-1632-2.

Beletew, B., Mengesha, A., Wudu, M. and Abate, M. (2020). Prevalence of neonatal hypothermia and its associated factors in East Africa: a systematic review and meta-analysis, *BioMed Central Pediatrics* 20(148): 1-14. https://doi.org/10.1186/s12887-020-02024-w

Demissie, B. W., Abera, B. B., and Chichiabellu, T.Y. (2018). Neonatal hypothermia and associated factors among neonates admitted to neonatal intensive care unit of public hospitals in Addis Ababa , Ethiopia. *BioMed Central Pediatrics* 18(263):1–10. https://doi.org/10.1186/s12887-018-1238-0

Demtse, A.G., Pfister, R.E. Nigussie, A.K., McClure, E.M., Ferede, Y.G., Bonger, Z.T., Mekasha, A., Demisse, A.G., Gidi, N.W., Metaferia, G., Worku, B., Goldenberg, R.L. and Muhe, L.M. (2020). Hypothermia in Preterm Newborns: Impact on Survival, *Global Pediatric Health*, 7: 1–8. https://doi10.1177/2333794X20957655

Ewusie, J. E., Blondal, E., Soobiah, C., Beyene, J., Thabane, L., Straus, S. E., and Hamid, J. S. (2017). Methods , applications , interpretations and challenges of interrupted time series (ITS) data : protocol for a scoping review. *British Medical Journal* 1–4. https://doi.org/10.1136/bmjopen-2017-016018

Kabwijamuydia, Waiswa, P., Kawooya, V., Nalwadda, C.K., Okuga, M., and Nabiwemba, E.L. (2016). *Newborn Care Practices among Adolescent Mothers in Hoima District Western Uganda*, *L. journal.pone* 1–12. https://doi.org/10.1371/journal.pone.0166405

Nasir, N. M., Amran, Y., and Nakamura, Y. (2017). Changing knowledge and practices of mothers on newborn care through mother class: An intervention study in Indonesia. *Journal of Tropical Pediatrics*, *63*(6), 440–446. https://doi.org/10.1093/tropej/fmx010

National Population Commission and ICF, (2018) Nigerian Demographic and Health Survey, Abuja, Nigeria and Rockville, Maryland, USA. 22

Olawuyi, O., Ezenwa, B. N., Fajolu, I. B., Onwuama, M., and Ezeaka, C. V. (2021). Knowledge, attitude and practice of kangaroo mother care among mothers in the neonatal wards of a tertiary care center. *Pan African Medical Journal*, *38*. https://doi.org/10.11604/pamj.2021.38.364.22833

Perez, M.J., Chang, J.J., Temming, L.A., Carter, E.B., López,J.D., . Tuuli, M.G., Macones, G.A., and Stout, M.J. (2020). Driving Factors of Preterm Birth Risk in Adolescents, *American Journal Perinatol* https://doi.ttps://doi.org/10.1055/s-0040-1715164.

Pisoni, G. B., Gaulis, C., Suter, S., Rochat, M. A., Makohliso, S., Roth-kleiner, M., Kyokan, M., and Pfister, R. E. (2022). *Ending Neonatal Deaths From Hypothermia in Sub-Saharan Africa : Call for Essential Technologies Tailored to the Context*. *10*(April), 1–10. https://doi.org/10.3389/fpubh.2022.851739

Qi, W., Liu, Y. Lv, H., Ge, J., Meng, Y., Zhao, N., Zhao, F., Qing Guo, Q. and Hu, J. (2022). Effects of family relationship and social support on the mental health of Chinese postpartum women, *BioMed Central Pregnancy and Childbirth* 22:65. https://doi.org/10.1186/s12884-022-04392-w

Ting J.Y., Synnes A.R., Lee S.K., (2018). Association of admission temperature and death or adverse neurodevelopmental outcomes in extremely low-gestational age neonates. *Journal of Perinatol*, 38:844–849.

Wako, W.G., Beyene, B.N., Wayessa, Z.J., Fikrie, A., Amaje, E. (2022) Assessment of neonatal thermal cares: Practices and beliefs among rural women in West Guji Zone, South Ethiopia: A cross-sectional study. *PLOS Glob Public Health* 2(6): 1-15. https://doi.org/10.1371/journal.pgph.0000568

Yitayew, Y.A., Aitaye, E.B., Lechissa, H.W. and Gebeyehu, L.O. (2020). Neonatal Hypothermia and Associated Factors among Newborns Admitted in the Neonatal Intensive Care Unit of Dessie Referral Hospital, Amhara Region, Northeast Ethiopia. *International Journal of Pediatrics*, 1-8 https://doi.org/10.1155/2020/3013427