

A Randomized Control Trial to assess the effectiveness of mHealth on use of Postpartum Contraception and Identification of barriers to uptake among Postnatal Women

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ABSTRACT

Introduction: Knowledge of contraception and practice remain, low in the postpartum period. Postpartum contraception (PPC) can be used to avoid unplanned pregnancies, and decrease the maternal, infant, child morbidity and mortality rate. **Objectives:** (a) To assess the effectiveness of mHealth on knowledge regarding contraception and uptake of PPC among antenatal and postnatal women. (b) Identify barriers to uptake of PPC among postnatal women. **Methodology:** A randomized control trial was conducted on 120 participants. 60 study participants in each group. The randomization was done by using computer-generated random numbers into two groups. The data was collected through the structured interview method and Self-reporting. In experimental group each participant was explained in detail about the method of PPC at the time of enrollment and sent text SMS, WhatsApp message and voice calling for every week at 37 weeks upto six weeks of postpartum period. In control group routine care was provided by health professionals according to institutional policy. **Results:** mHealth associated with was increase in knowledge score regarding contraception ($p < 0.001$), while there was no change seen in the control group. There was increase use of PPC at the time of delivery in the experimental group ($p < 0.030$) as compared to the control group. **Conclusion:** mHealth was found effective in raising awareness and knowledge regarding contraception in postnatal women after the intervention. There was also a significant increase in uptake of PPC among postnatal women and helps to identify the barriers to uptake PPC.

Key words: mHealth –mobile health, PPC – postpartum contraception

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Introduction

Unwanted pregnancies account for about 50% of all pregnancies worldwide¹. Approximately 810 women die every day from treatable causes associated to pregnancy and childbirth. Lower middle-income nations report for 94% of all maternal deaths. India continues to have the big rate of female dying during parturition in the world, with many of these deaths being caused by preventable causes. Contraception usage lowers the number of high risk and high parity births, which lowers maternal deaths² and, by reducing unplanned pregnancy, has a notable impact on the lives, health, empowerment, and well-being of both women and their families³. By effectively reducing the birth-to-pregnancy interval by at least 2 years and the birth interval by at least 3 years, postpartum contraception can prevent more than 30% of maternal deaths and 10% of infant deaths⁴. According to Roy et al (2021), the prevalence of postpartum contraceptive methods use at six weeks is 10% and six months is 21%, and at 12 and 24 months, it is approximated to be 26%⁵.

The barriers to contraceptive use are perceived health risks, including effects on future menstruation, weight, fertility, distrust of contraceptives, surrounding pregnancy intentions, women desire to become pregnant, limited access to contraceptives,

cultural, social pressure on women, financial and regional barriers related to the lack of access to services⁶. mHealth interventions may support the use of contraceptives by providing information and support to women. The need of study is to find some use of PPC through mHealth text messaging and voice calls could be used to improve knowledge, change in behavior of PPC uptake, and to identify the barriers which will help helps to plan the future intervention.

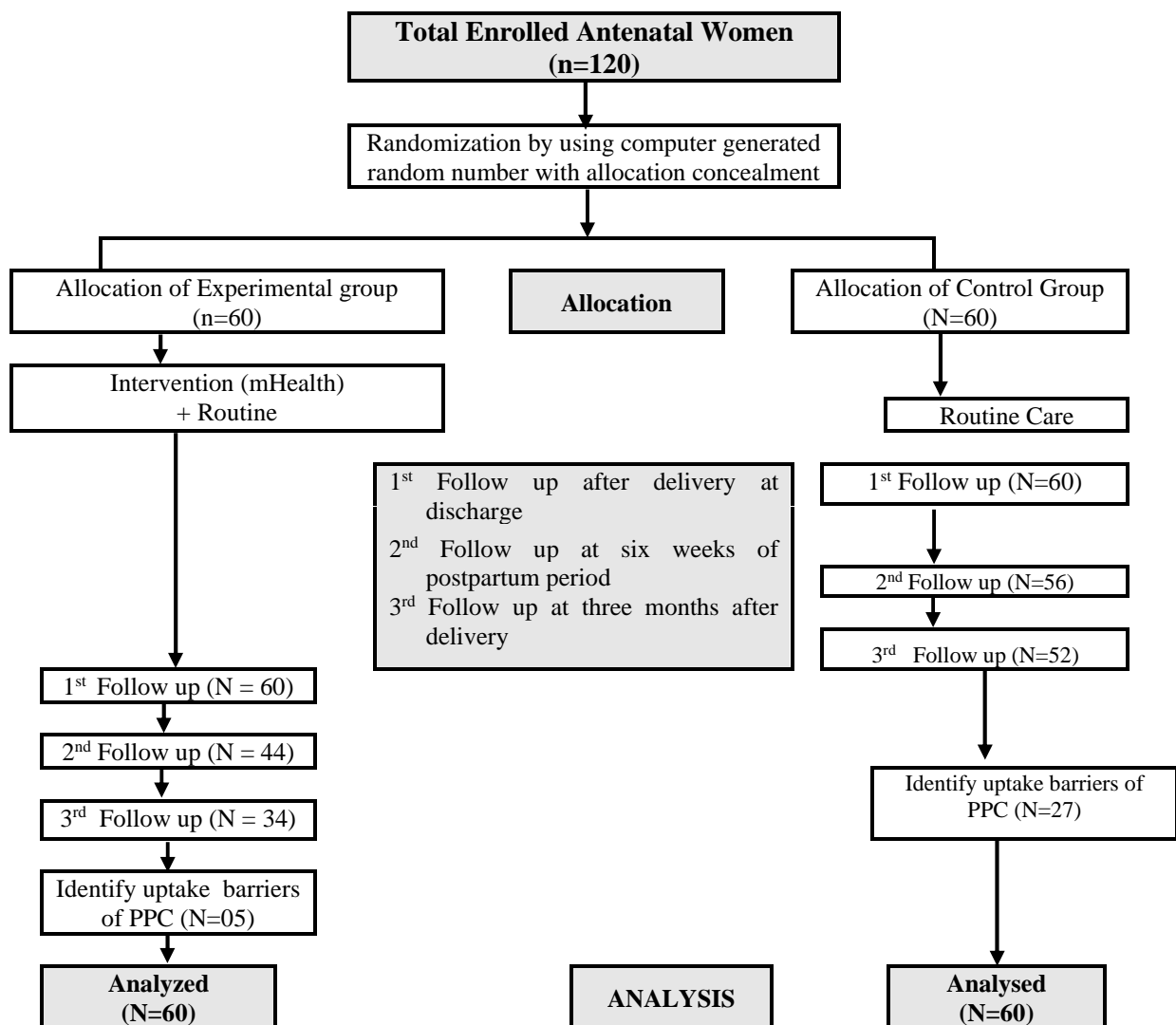
Objectives of the study

-) To assess the effectiveness of mHealth on knowledge regarding contraception and uptake of PPC among antenatal and postnatal women.
-) Identify barriers to uptake of postpartum contraception among postnatal women.

Material and Methods

The study design was a randomized control trial. The trial was registered in CTRI as per Registration No. CTRI/2021/05/043961. The study was conducted in Obstetric units, PGIMER, Chandigarh. The sample size was calculated using www.openepi.com, according to the study by Harrison MS et al (2020)⁷. Prevalence ratio was 5.6 of using contraception methods. The number of study participants needed for the study with confidence level of 95%, test power of 80%, was estimated at 48 in each group. By considering 20% drop out rate sample size 120 was taken.

Figure-1: Consort Diagram



Randomization by employing computer generated random number and allocation concealment was guaranteed by the use of sequentially numbered, opaque and sealed envelopes into two blocks using the seed 28342. A total of 120 participants i.e., 60 in the experimental group and 60 in the control group (Fig 1) were selected from ANC OPD by using the total enumeration sampling technique i.e., all the participants visiting ANC OPD fulfilling inclusion criteria during September 2021 to January 2022 were enrolled. The inclusion criteria antenatal women enrolled at 37th weeks of POG who were willing to participate in the study. Exclusion criteria antenatal women had diagnosis of psychiatric illness.

Procedure of data collection

An Experimental two-group Pre-intervention Post-intervention Control group study was conducted. The data was collected through the interview method and self-reporting by using a questionnaire comprising of socio-demographic and clinical profile, knowledge questionnaire regarding contraception and checklist. The protocol included detailed information regarding contraception, steps to use different types of contraceptives along with the WHO medical eligibility criteria wheel (2015) for contraceptive use.

Patients enrolled in the experimental group were provided intervention of mHealth (text messages and voice calling) for use of postpartum contraception. Participants were explained in detail about failure rate, successful rate, pros and cons of each method so that they can voluntarily make good choice for themselves. Education and counseling were given to the experimental group by one-to-one teaching regarding use of PPC by using the module. At the end of the session participant's doubts were clarified. There after module text messages, WhatsApp messages and voice calling was sent to participants in experimental group upto six weeks of postnatal period. After two weeks of mHealth post test was done to assess the effectiveness of intervention (mHealth) for knowledge and use of PPC. In control group routine care was provided by health professionals like antenatal care, intrapartum care, family planning counseling, postpartum care, newborn care according to departmental policy.

Regular follow-up of the patient was planned according to the routine schedule. Three follow-ups in postnatal period (at discharge, at six weeks and at three months) which was done by the investigator after delivery to assess the uptake of PPC and identify barriers to uptake of PPC. 1st follow-up was conducted physically after delivery at discharge of patients, 2nd and 3rd Follow-up was conducted telephonically and physically. If they had any doubt related to use of PPC or any other doubt regarding the contraception they ask and were told to send text messages and voice calling message so that they could have discussion with the researcher.

Ethical consideration: Ethical approval was obtained from Institute Ethical Committee, PGIMER, Chandigarh. Recruited study participants were provided with a patient information sheet and informed written consent was taken. Confidentiality of data and anonymity of the participants were ensured.

Results

Statistical analysis of the collected data was employed by the statistics program IBM SPSS 20.0. Data was expressed in frequency and percentage.

Socio-demographic Profile of Antenatal Women of Experimental and Control Group

Table-1 depicts the socio-demographic characteristics of antenatal women in both the group were comparable. Chi-square was used to compare the categorical variable. The median age of antenatal women in experimental group 28, (IQR=25-31) and 28, (IQR=25-30.75) in control group. The majority of antenatal women's age of marriage was 18-26 years in the experimental group (76.7%) and control group (81.7%). 63.3% antenatal women in experimental group and 71.7% in control group has duration of marriage for last 5 years. 26.7% of study participants in experimental group possessed the education up to high school and 26.7% were graduated whereas in the control group 31.7% had education up to high school and (28.3%) were graduated. Majority of the antenatal women were unemployed/housewife, (73.3%) in the experimental group and 71.7% in the control group. More than half of the participants belonged to a joint family in both groups. Half of the antenatal women in the experimental group were residing in the rural areas (50.0%) whereas in the control group (55.0%) antenatal women were residing in the rural areas. In this study few antenatal women were having more than one antenatal complication. Both the groups were found to be comparable (as per chi square $p>0.05$).

Table-1: Socio-demographic Profile of Antenatal Women of Experimental and Control Group (N=120).

Demographic Variables		Groups			
		Experimental (n=60)		Control (n=60)	
		No.	%	No.	%
Age* (in years)	20 – 25	16	26.7	17	28.3
	26 – 30	25	41.6	28	46.7
	31 – 36	19	31.6	15	25
	2; df; p value	2=0.671; df= 2; p=0.715			
Age of marriage	18-26	46	76.7	49	81.7
	27-32	14	23.3	11	18.3
	2; df; p value	2=0.455; df= 1; p= 0.500			
Duration of marriage	1-5	38	63.3	43	71.7
	6-10	19	31.7	15	25.0
	11-15	03	5.0	02	3.3
	2; df; p value	2=0.979; df= 2; p= 0.613			
Educational status - Self	Primary school	02	3.3	03	5.0
	Middle school	11	18.3	07	11.7
	High school	16	26.7	19	31.7
	Diploma / Intermediate	03	5.0	02	3.3
	Graduate	16	26.7	17	28.3
	Post graduate and above	12	20.0	12	20.0
	2; df; p value	2=1.576; df=5; p=0.904			
Educational status Husband	Primary school	03	5.0	03	5.0
	Middle school	08	13.3	03	5.0
	High school	13	21.7	23	38.3
	Diploma / Intermediate	05	8.3	05	8.3
	Graduate	26	43.3	18	30.0
	Post graduate and above	05	8.3	08	13.3
	2; df; p value	2=7.197; df=5; p=0.206			
Occupation Self	Unemployed	44	73.3	43	71.1
	Unskilled	02	3.3	03	5.0
	Skilled	07	11.7	05	8.3
	Professional	07	11.7	09	15.0
	2; df; p value	2=0.795; df=3; p=0.851			
Types of family	Nuclear	13	21.7	14	23.3
	Joint	45	75.0	46	76.7
	Extended	02	3.3	--	--
	2; df; p value	2=2.048 ; df=2; p= 0.359			
Socio economic status (based on per capita income in rupees)	61,663 - 1,23,321	02	3.3	02	3.3
	46,129 - 61,662	07	11.7	04	6.7
	30,831-46,128	9	15.0	12	20.0
	18,497-30,830	14	23.3	11	18.3
	6,175 -18,496	22	36.7	23	38.3
	<6174	06	10.0	08	13.3
	2; df; p value	2=1.915; df=5; p=0.861			
Habitat	Rural	30	50.0	33	55.0
	Urban	30	50.0	27	45.0
	2; df; p value	2=301; df=1; p=0.583			
Gravida	Primi	27	45.0	33	55.0
	Multi	33	55.0	27	45.0
	2; df; p value	2=1.200; df=1; p=0.273			
Clinical diagnosis	Without antenatal complications	25	41.7	32	53.3
	With antenatal complications	35	58.3	28	46.7
	2; df; p value	2=1.637; df=1; p=0.201			

* Age Median IQR (experimental group) 28, (31 - 25), (control group) 28, (30.75-25).

* Socio economic status (based on per capita income in Rupees) as per modified Kuppaswamy scale (2021).

Comparison of level of knowledge regarding contraception before and after mHealth

Table-2 shows that comparison of level of knowledge regarding contraception in antenatal and postnatal women at pre intervention and post intervention assessment. At pre intervention there was no significant difference in the level of knowledge regarding contraception in antenatal women among both groups. After intervention there was statistically significant increase in average level of knowledge regarding contraception in experimental group (68.3%) as compared to control group (23.3%) ($p < 0.001$).

Table- 2: Comparison of level of knowledge regarding contraception before and after mHealth

Total score knowledge	Pre Test Female				Post Test Female			
	Exp Group (n=60)		Control Group (n=60)		Exp Group (n=60)		Control Group (n=60)	
	No.	%	No.	%	No.	%	No.	%
Poor Knowledge (0-13)	45	75.0	47	78.3	7	11.7	46	76.7
Average Knowledge (14-26)	15	25.0	13	21.7	41	68.3	14	23.3
Good Knowledge (27-40)	--	--	--	--	12	20.0	--	--
2, df, p value	2= 0.186 df=1 p=0.415				2=53.953df=2 p<0.001			

Use of Postpartum Contraception

Table- 3 shows that the use of postpartum contraception. At the time of delivery, the statistically significant difference was seen on use of PPC in the experimental group Cu T 380A (13.3%), tubectomy (10.0%) as compared to the control group Cu T 380A (3.3%), tubectomy (1.07%) ($p < 0.030$). At six weeks and three months after delivery there was increased use of PPC in the experimental group as compared to the control group but a statistical difference was not seen p value (at six weeks $p > 0.268$ and at three months $p > 0.254$). At three months after delivery condom was the most common contraceptive methods used in both groups.

Table -3: Use of Postpartum Contraception

Time of initiation of PPC	Methods used	Experimental Group		Control Group		2, df, p Value
		No.	%	No.	%	
At the time of delivery	Tubectomy	8	13.3	2	3.3	$\chi^2 = 8.945$; Df= 3 $P < 0.030$
	Cu T 380A	6	10.0	1	1.7	
	Cu T 375	2	3.3	1	1.7	
At six weeks	Condom	7	11.7	3	5.0	$\chi^2 = 3.940$; df=3 $p = 0.268$
	DMPA	2	3.3	---	---	
	Withdrawal method	1	1.7	1	1.7	
At three months	Condom	14	23.3	21	35.0	$\chi^2 = 8.976$; df=7 $p = 0.254$
	Cu T 380A	1	1.7	---	---	
	Cu T 375	1	1.7	---	---	
	Pills	6	10.0	2	3.3	
	DMPA	2	3.3	---	---	
	Withdrawal method	2	3.3	1	1.7	
	Calendar method	3	5.0	1	3.3	

Barriers to uptake postpartum contraception

Table -4 depicts the reason of not using contraception methods in post partum period. Barriers to uptake of PPC were reported by experimental group was lactational amenorrhea (5.0%) and husband did not agree (5.0%) whereas in control group more than half of the participants (35.0%) reported lactational amenorrhea. Others barriers to uptake in control group PPC that is husband did not agree (8.3%), residing away from partner (10.0%), not decided yet (8.3%) and few other barriers i.e. want more children, husband did not agree, objection by relatives, episiotomy site pain, unstable mood, planning for IUCD and tubectomy, not interested, busy life, weight gain, menstrual problem, fear of side effects and infertility, burning sensation in perineum area. Higher percentage of barriers was in control group as compared to experimental group.

Table- 4: Barriers to uptake postpartum contraception (N=32)

Variables	Exp. Gp (n-05)		Control Gp (n-27)	
	No.	%	No.	%
Want More Children	2	3.3	2	3.3
Lactational amenorrhea	3	5.0	21	35.0
Husband did not agree	3	5.0	5	8.3
Objection by relatives and friends	1	1.7	2	3.3
Health Concerns are: Episiotomy site pain	1	1.7	1	1.7
Burning sensation in perineal area	---	---	1	1.7
Lower back pain	1	1.7	1	1.7
Unstable mood	1	1.7	3	5.0
Menstrual problem	---	---	1	1.7
Fear of side effects	---	---	1	1.7
Fear of infertility	---	---	1	1.7
Weight gain	---	---	1	1.7
Others are: Not interested	---	---	3	5.0
Busy life	1	1.7	1	1.7
Residing away from partner	1	1.7	6	10.0
Not decide yet	---	---	5	8.3
Planning for Tubectomy	---	---	3	5.0
Planning for Cu T	1	1.7	1	1.7

Discussion

Postpartum contraception knowledge and practice remain low in the postpartum period⁵. So, a need was felt to improve the use of mHealth in increase knowledge and use of postpartum contraception and identification of barriers to uptake among postnatal women at PGIMER, Chandigarh (2020-22). The mHealth module was prepared with pictures to make it attractive. Education, counseling, and teaching were given with the help of the module by face-to-face interaction at the time of the enrollment by the researcher. With the help of the module, the teaching became easier at the time of the Covid-19 pandemic because education can be imparted from long distance also.

The teaching regarding postpartum contraception and in turn asking about the use of postpartum contraception and identifying barriers to uptake was also done using a checklist. As per the principle of learning, "I hear and I forget, I see and I remember, I do and I understand", return asking is the best methods to enhance learning. Since it was not possible to remember all the content in one session, module was given to the participants on WhatsApp for ready reference and future use. During follow up, every study participant was motivated and their queries were resolved.

In this study there was no loss of subjects to follow up. In the present study median age of the antenatal women in the experimental group was 28, (IQR=25-31) and 28, (IQR=25-30.75) in the control group Similarly, in a study done by Harrington et al (2019) the median age of the control group was 23 years (IQR=20-26.5), and the median age of the experimental group was 22.5 years. The age group of the above study was lower as compared to the findings of current study⁸. In the present study, 26.7% of study participants in experimental group possessed the education status of high school whereas in the control group 31.7% had the high school education. Comparably, in study done by Harrington et al (2019) most of the participants had higher secondary education (26.2%) in the experimental and (10.8%) in the control groups⁸.

The present study revealed that during baseline assessment, participants were having a poor score of knowledge regarding contraception in both groups ($p > 0.415$). Comparably, in a study done by Chuang et al (2004) who conducted a written survey to assess baseline knowledge of emergency contraception on graduate students in the Boston community (USA). Their findings focused on the need to increase education about emergency contraception⁹.

In the present study after the implementation of the mHealth protocol, there was a significant increase in knowledge regarding contraception in the experimental group as compared to the control group ($p < 0.001$). Current study results were similar to the study conducted by Johnson et al (2017) which reported poor knowledge score at baseline assessment, but after implementation of mobile phones for health found that full access to mobile for reproductive health (m4RH) increased contraceptive knowledge by 14% in the experimental group as compared to control group¹⁰.

In the present study, mHealth was found effective increase in uptake of PPC. Similarly Dev R et al. and Gul X et al (2019) in their study reported found mobile phone to increase in awareness of maternal health, contraception and use of postpartum contraceptive methods through the use of mobile phones^{6, 11}. A similar study was conducted by Harrington et al (2019) it was reported that 69.9% of the participants in experimental group used highly effective contraception, compared to 57.4% of the control group⁸. Supportive findings of a systemic review by Aung et al (2020) study revealed that the delivery of mHealth interventions for improving family planning increase contraceptive use in LMIC¹². Supportive results of study by Bhagia (2018) on mobile technology for increasing postpartum family planning acceptability the development of a mobile-based intervention, they found that the effective PFP has increased to 29.7% from 4.9%, indicating that acceptance has increased¹³.

In the present study, the main barriers to uptake of PPC were reported by experimental group was lactational amenorrhea (5.0%) and husband did not agree (5.0%) whereas in control group more than half of the participants (35.0%) reported lactational amenorrhea. Others barriers to uptake PPC that is husband did not agree, residing away from partner, not decided yet, want more children, husband did not agree, objection by relatives and friends, episiotomy site pain, unstable mood, planning for cu T and tubectomy etc. These findings are in agreement with the a review done by Harrison et al (2017) to find reasons for not using immediate PPC was lactational amenorrhea and abstinence¹⁴. Similar study done by Sowmya et al (2020) concluded that fear of side effects, desire for a child, husband and in-law disapproval, lack of knowledge about contraceptive methods, and lack of motivation to use were barrier of PPC¹⁵. In a study by Divakar et al (2019) it was reported that the primary causes for consent withdrawal were objections voiced by family members (43.44 %), spouse disagreement (27.94%), and deciding on a different method (15.59%)¹⁶.

The less use of PPC at 6 weeks were probably due to advice of health professionals to avoid intercourse till six weeks of postnatal period, due to complications in postnatal period, complications of babies, lactational amenorrhea, short term follow up (only three follow up were done) and more need of sending text messages and voice calling for motivating and reinforcing uptake of PPC. MCH center, community health center, healthcare physicians, and hospital nurses can use this intervention for all antenatal women to improve their knowledge of contraception, on use of PPC and also to identify the barriers to uptake among postnatal women of early as 32-34 weeks of gestation so that there will be enough time for sending messages and voice calling, as to reinforce the importance of long term follow up which is required for better effectiveness of mHealth.

Strengths

-) In the present study WHO medical eligibility criteria wheel was used for contraceptive use (2015).
-) Computer-generated randomization technique was used.

Limitations

-) The findings are specific to women from the northern region of India who visited PGIMER, Chandigarh, and cannot be applied to women from other regions of the country.
-) Long-term follow-up was required to see the further effectiveness of mHealth on use of PPC.
-) Other sources, such as online media, physicians, other antenatal mothers, family, and friends, can also influence knowledge about contraception and PPC use.

Conclusion

In the present study, mHealth was found effective in raising awareness and knowledge regarding contraception in postnatal women after the intervention. There was increase in uptake of postpartum contraception. This intervention was also significant to identify the barriers to uptake the postpartum contraception. The main barriers to uptake of PPC were lactational amenorrhea, opposed by husband, residing away from partner and they have not decided yet.

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