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Reproductive Health Status and Pregnancy Outcomes Among Nurses in Southern India

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KEYWORDS

shift work, female nurses, reproductive health, private hospital, government hospital

ABSTRACT:

The study conducted in Southern India delves into the reproductive health challenges faced by 500 registered female nurses (25-45yrs) in government and private hospitals located in Thiruvananthapuram. It primarily examines the regularity of menstrual cycles and prevalent gynecological issues through purposive sampling. The findings reveal that a significant proportion of nurses, comprising 74% in government hospitals and 84.8% in private facilities, maintain regular menstrual cycles. However, various gynecological problems such as infertility, hysterectomy, breast and ovarian cancers, early menopause, bleeding disorders, fibroids, ovarian cysts, and PCOD are prevalent among them, with a higher prevalence observed in the private sector. Furthermore, the study investigates the potential impact of shift work on reproductive outcomes, though no substantial associations were found, contrasting with findings from other studies. Despite this, the study underscores the pressing need to address the reproductive health concerns of nurses in Southern India. It emphasizes the significance of understanding both the regularity of menstrual cycles and the prevalence of gynecological issues. Further research is deemed essential to comprehensively grasp and address the reproductive health needs of nurses in the region. Such endeavors aim to promote their overall well-being and quality of life, thereby enhancing their effectiveness in healthcare delivery.

1. Introduction

Research on reproductive health among shift workers in India is emerging. Studies explore how irregular work hours impact menstrual regularity, fertility, and gynecological issues. Understanding these effects is crucial for occupational health and worker well-being.

A review of the evidence on risky reproductive outcomes due to the shift work by Stocker *et.al* (2014) reports that shift work was associated with adverse reproductive outcomes for women, like modest increase in spontaneous abortions, preterm births and reduced ability for women to become pregnant.

It was hypothesized that shifts affected the circadian rhythms, either through sleep disturbances or altered melatonin production, which may have a role in regulating the reproductive hormones that control the menstrual cycle (Lawson et.al, 2015; Gamble et.al, 2013)

Previous studies have reported that job features of nurses including long working hours, extensive standing and shift work rotations contributed to the high levels of stress and fatigue, which resulted in heightened risk of an array of reproductive health adverse events (Quansah *et.al*, 2009; Lawson *et.al*, 2009; Yang *et.al*, 2014).

Our aim was to investigate the potential influence of shift work on pregnancy outcomes, examining details of respondents' menstrual history including regularity, duration, and interval of menstrual cycles, dysmenorrhea, as well as assessing various reproductive health problems experienced by the participants.

2. Methodology

This study employed a cross-sectional, comparative design and utilized purposive sampling. The sample comprised 500 registered female nurses aged 25-45 years, selected from government and private hospitals in

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both rural and urban areas of Thiruvananthapuram city, Kerala, India. Data collection occurred over a period exceeding one and a half years, encompassing government hospitals in both rural and urban locales, as well as private hospitals within the same regions of Thiruvananthapuram, Kerala. After obtaining necessary permissions, the researcher coordinated with Nursing Superintendents of the respective hospitals to arrange convenient interview times with participants. The researcher provided an overview of the study's objectives to the respondents,

and interviews were conducted at their workplaces if they were comfortable, preferably towards the conclusion of their shifts, without causing disruption to their routine duties.

Alkashif (2018) reported in his study on nurses in Egypt, that those who were working on rotating shift hours had menstrual irregularity, severe bleeding and dysmenorrhoea. So the investigator elicited information regarding regularity of menstrual periods, duration and interval of menstruation cycle, dysmenorrhoea, nature of discomfort and medication during menstruation time. The reproductive history of the subjects were collected with respect to gynaecological or obstetric problems, number of the pregnancies and poor and good pregnancy outcomes; details on preterm births and LBW babies.

Health impairments, including reproductive issues, are associated with night work or rotating shifts. Shift work has been associated with an increased risk of irregular menstrual cycles, endometriosis, infertility, miscarriage, low birth weight or pre-term delivery and reduced incidence of breastfeeding (Gamble *et al*, 2013). To know the pregnancy outcome issues in shift work, the pregnancy history of the respondents was recorded by using a pre-tested schedule. Association of shift variables and pregnancy outcome were also analysed.

3. Result And Discussion

The menstrual history of respondents such as regularity of menstrual periods, duration and interval of menstruation cycles, dysmenorrhoea, nature of discomfort and medication during menstruation time were collected. It was hypothesized that shifts affected the circadian rhythms, either through sleep disturbances or altered melatonin production, which may have a role in regulating the reproductive hormones that control the menstrual cycle (Lawson *et.al*, 2015; Gamble *et.al*, 2013). Details on reproductive profile of respondents are given in table 1.

Table 1: Reproductive profile of the respondents

Particulars	**Govt. Hospitals n=250**		**Total**	**Private hospitals n=250**		**Total**
	Rural	**Urban**		**Rural**	**Urban**	
Pattern of menstrual cycle Regular	83(33.2)	102(40.8)	185(74.0)	108(43.2)	104(41.6)	212(84.8)
Irregular	34(13.6)	21(8.4)	55(22.0)	17(6.8)	21(8.4)	38(15.2)
Ceased	8(3.2)	2(0.8)	10(4.0)	-	-	-
Total	**125(50.0)**	**125(50.0)**	**250(100.0)**	**125(50.0)**	**125(50.0)**	**250(100.0)**
Menstrual cycle length (days) <20 days	3(1.2)	1(0.4)	4(1.6)	1(0.4)	1(0.4)	2(0.8)
20-<35 days	86(34.4)	105(42.0)	191(76.4)	104(41.6)	102(40.8)	206(82.4)
≥35 days	28(11.2)	17(6.8)	45(18.0)	20(8.0)	22(8.8)	42(16.8)
Total	**117(46.8)**	**123(49.2)**	**240(96.0)**	**125(50.0)**	**125(50.0)**	**250(100.0)**
Duration of bleeding(days) 1-5	91(36.4)	99(39.6)	190(76.0)	114(45.6)	109(43.6)	223(89.2)

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6-10	22(8.8)	24(9.6)	46(18.4)	10(4.0)	16(6.4)	26((10.4)
>10 days	4((1.6)	-	4(1.6)	1(0.4)	-	1(0.4)
Total	**117(46.8)**	**123(49.2)**	**240(96.0)**	**125(50.0)**	**125(50.0)**	**250(100.0)**
Nature of bleeding Light	5(2.0)	9(3.6)	14(5.6)	6(2.4)	3(1.36)	9(3.6)
Normal	92(36.8)	104(41.6)	196(81.7)	98(39.2)	104(41.6)	202(84.2)
Heavy	20(8.0)	10(4.0)	30(12.0)	21(8.4)	18(7.2)	39(15.6)
Total	**117(46.8)**	**123(49.2)**	**240(96.0)**	**125(50.0)**	**125(50.0)**	**250(100.0)**
Dysmenorrhoea Yes	16(6.4)	20(8.0)	36(14.4)	18(7.2)	24(9.6)	42(16.8)
No	101(40.4)	103(41.2)	204(81.6)	107(42.8)	101(40.4)	208(83.2)
Total	**117(46.8)**	**123(49.2)**	**240(96.0)**	**125(50.0)**	**125(50.0)**	**250(100.0)**
Medication for pain Yes	22(8.8)	16(6.4)	38(15.2)	9(4.09)	20(8.0)	29(11.6)
No	95(38.0)	97(38.8)	192(76.8)	112(44.8)	100(40.0)	212(84.8)
Sometimes	18(8.18)	16(6.4)	34(13.6)	9(4.09)	20(8.0)	29(11.6)
Total	**117(46.8)**	**123(49.2)**	**240(96.0)**	**125(50.0)**	**125(50.0)**	**250(100.0)**

Number in parenthesis indicates percentage

Majority of nurses in government (74%) and private (84.8%) hospitals had regular periods, while sixteen percent of nurses in government and fifteen percent of nurses in private were having irregular periods. Lawson *et.al* (2011) suggested only a weak link between rotating shift work and irregular menstrual cycles. Majority of respondents in government (76%) and private (89%) hospitals had the bleeding duration between 1-5days which is normal. Eighty two percent in government and 84 percent in private hospitals nurses had normal bleeding. Fourteen percent of nurses in government and 17 percent of nurses in private hospitals had dysmenorrhoea. Majority of respondents in government (15%) and private (12%) hospitals were taking medicines for relief from pain during menstruation. Butsripoom and Tengkiattrakul **(**2011) studied the association

between dysmenorrhoea and shift work among nurses and concluded that there was no association found between shift work and dysmenorrhoea.

The various reproductive health problems faced by the respondents were viewed. Reproductive health problems were categorised into 5 main problems- Fertility, hysterectomy (surgical removal of uterus), Cancer (breast and ovarian cancers), menstrual problems (irregular periods, early menopause, bleeding problems) and other gynec problems (fibroids, ovarian cyst, PCOD).

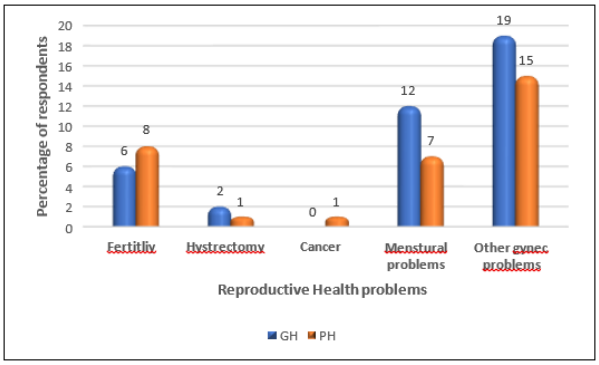

Figure 1. Distribution of respondents based on reproductive health problems

From the figure 1, it shows that few respondents in government (19%) and private (15%) hospitals faced gynec problems like fibroid and PCOD. This was followed menstrual problems, where in 12 percent nurses in government and 7 percent nurses in private hospitals faced this problem. These health problems were followed

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by fertility problem among 6% percent of respondents in government and 8 percent of respondents in private hospitals. Two percent of respondents in government and 1 percent nurses of private hospitals underwent hysterectomy, ie the surgical removal of complete uterus due to the various problems such as heavy bleeding, uterine prolapse, fibroids which caused severe pain etc. One percent of respondents of private hospitals reported to have cancer. Stocker (2014) from the University of Southampton, UK, indicates that working shift patterns was associated with an increased risk of menstrual disruption and subfertility (www.sciencedaily.com).

The pregnancy outcome of the respondents and its association with shift variable were checked to know whether there was any influence of shift work on pregnancy outcome.

3.1 Pregnancy Profile

Previous studies have reported that job features of nurses including long working hours, extensive standing and shift work rotations contributed to the high levels of stress and fatigue, which resulted in heightened risk of an array of reproductive health adverse events (Quansah *et.al*, 2009; Lawson *et.al*, 2009; Yang *et.al*, 2014). In the present study, the pregnancy outcome of nurses were studied among 100 respondents from government (n=50) and private (n=50) hospitals. Here in, details on pregnancy outcomes and birth weight of their children were collected.

Table 2: Pregnancy outcome of nurses in government hospitals

Reproductive particulars	**Sequence of pregnancy n=50**					
	First pregnancy		**Total**	**Second pregnancy**		**Total**
	Rural	**Urban**		**Rural**	**Urban**	
Poor outcome Abortion/miscarriage	3(6.0)	4(8.0)	7(14.0)	1(2.0)	1(2.0)	2(4.0)
Ectopic pregnancy	-	-	-	0(0.0)	1(2.0)	1(2.0)
C-section	7(14.0)	9(18.0)	16(32.0)	10(20.0)	4(8.0)	14(24.0)
MTP	-	-	-	0(0.0)	1(2.0)	1(2.0)
Total	**10(20.0)**	**13(26.0)**	**23(46.0)**	**11(22.0)**	**7(14.0)**	**18(36.0)**
Good out come Normal delivery	14(28.0)	6(12.0)	20(40.0)	8(16.0)	4(8.0)	12(24.0)
Total	**14(28.0)**	**6(12.0)**	**20(40.0)**	**8(16.0)**	**4(8.0)**	**12(24.0)**
Birth weight Above 2500gm	18(22.0)	15(30.0)	33(66.0)	11(22.0)	8(16.0)	19(38.0)
Below 2500gm	3(6.0)	0(0.0)	3(6.0)	7(14.0)	0(0.0)	7(14.0)
Total	**21(42.0)**	**15(30.0)**	**36(74.0)**	**18(36.0)**	**8(16.0)**	**26(52.0)**

Number in parenthesis indicates percentage

Forty six percent of respondents in government hospitals had poor pregnancy outcome and 40 percent had good pregnancy outcomes during first pregnancy. Remaining 14 percent of nurses in government were unmarried or childless. About 32 percent of the problem pregnancy conditions had C-section delivery. Fourteen percent of respondents had miscarriage/ abortion during first pregnancy.

During their second pregnancy 36 percent had poor pregnancy outcome and 24 percent had good outcome. Four percentage of them reported miscarriage /abortion and one ectopic.

Low birth weight has been defined by World Health Organisation (1994) as birth weight of less than 2500gm.Sixty six percent of respondents delivered babies with the birth weight above 2500gm and 6 percent

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delivered babies below 2500gm birth weight in first pregnancy.

In the case of second pregnancy, 38 percent delivered babies with birth weight above 2500gm and 14 percent delivered babies below 2500gm birth weight. Low birth weight is the most important the cause of premature birth.

In government hospitals, 6 percent and 14 percent of LBW babies were reported in both first and second delivery respectively. The same percentage of preterm babies were reported in a study conducted by Sumsrisuwan *et.al* (2015) among nurses and nursing assistants of Thailand

Table 3: Pregnancy outcome of nurses in private hospitals

Reproductive particulars	Sequence of pregnancy n=50					
	First pregnancy		Total	Second pregnancy		Total
	Rural	Urban		Rural	Urban	
Poor outcome Abortion/miscarriage	1(2.0)	4(8.0)	5(10.0)	4(8.0)	3(6.0)	7(14.0)
C-section	5(10.0)	9(18.0)	14(28.0)	2(4.0)	4(8.0)	6(12.0)
Total	**6(12.0)**	**13(26.0)**	**19(38.0)**	**6(12.0)**	**7(14.0)**	**13(26.0)**
Good out come Normal delivery	16(32.0)	8(16.0)	24(48.0)	9(18.0)	2(4.0)	11(22.0)
Total	**16(32.0)**	**8(16.0)**	**24(48.0)**	**9(18.0)**	**2(4.0)**	**11(22.0)**
Birth weight Above 2500gm	19(38.0)	14(28.0)	33(66.0)	10(20.0)	5(10.0)	15(30.0)
Below 2500gm	2(4.0)	3(6.0)	5(10.0)	1(2.0)	1(2.0)	2(4.0)
Total	**21(42.0)**	**17(34.0)**	**38(76.0)**	**11(22.0)**	**6(12.0)**	**17(34.0)**

Number in parenthesis indicate percentage

In private hospitals, during first pregnancy 38 percentage of nurses had poor pregnancy outcome and 48 percent had good pregnancy outcome. Remaining 14 percent of nurses from private hospitals were unmarried or childless. Among poor pregnancy, about 28 percent of them had C- section and 10 percent had abortions/miscarriages. During second pregnancy, 26 percent of respondents had poor outcome and 22 percent had good pregnancy outcome. Fourteen abortion/ miscarriages and 12 C-sections were reported here. In both government and private hospitals all respondents were doing shift work from their inception day. Here also majority babies (66%) of respondents delivered babies in the birth weight above 2500gm and 10 percent delivered babies with birth weight below 2500gm. In the case of second pregnancy, 30 percent delivered babies with birth weight above 2500gm and 4 percent delivered babies with birth weight below 2500gm. In private hospitals, 10 percent and 4 percent of underweight babies were reported in both first and second delivery respectively.

Many studies have been reported that there is strong impact of shift work on pregnancy outcomes (Niedhammer *et.al*, 2009; Halliday-Bell *et.al*, 2009, Strohmaier *et.al*, 2018). But in the present study the situation is not that grave as in other studies.

3.2 Association of shift work and pregnancy outcome

Many complications were reported related to pregnancy and shift work. So in the present study the impact of shift work on some pregnancy outcomes were also analysed. Irregular work schedules are suspected to increase risk of pregnancy outcome and foetal health. Various maternal endocrine changes occur in the mother's body which along with sleep deprivations and shift timings will lead to serious complications in pregnancy outcomes.

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Association of shift variables and pregnancy outcome were analysed and the details are given below table 4.

Table 4: Association of shift work and pregnancy outcome in nurses from government hospitals (n=50)

Shift Variables	First pregnancy				Second pregnancy					
	Normal Delivery	C-Section	Miscarriage / Abortion	Total	Normal Delivery	C-Section	Miscarriage /Abortion	Ectopic pregnancy	MTP	Total
No: of shift change 1-3	4(8.0)	4(8.0)	0(0.0)	8(16.0)	3(6.0)	4(8.0)	0(0.0)	0(0.0)	1(2.0)	6(12.0)
4-6	16(32.0)	12(24.0)	7(14.0)	35(70.0)	9(18.0)	10(20.0)	2(4.0)	1(2.0)	0(0.0)	22(44.0)
Total	20(40.0)	16(32.0)	7(14.0)	43(84.0)	12(24.0)	14(28.0)	2(4.0)	1(2.0)	1(2.0)	30(60.0)
Chi square (p- value)	2.07(0.36)				1.13(0.57)					
No: of night shift rotation /month 2	16(32.0)	13(26.0)	7(14.0)	16(32.0)	10(20.0)	12(24.0)	2(4.0)	1(2.0)	0(0.0)	25(50.0)
3	4(8.0)	3(6.0)	0(0.0)	7(14.0)	2(4.0)	2(4.0)	0(0.0)	0(0.0)	1(2.0)	5(10.0)
Total	20(40.0)	16(32.0)	7(14.0)	43(86.0)	12(24.0)	14(28.0)	2(4.0)	1(2.0)	1(2.0)	30(60.0)
Chi square (p- value)	1.64(0.44)				5.66(0.23)					
Years of experience Up to10yrs	9(18.0)	11(22.0	5(10.0)	25(50.0)	7(14.0)	6(12.0)	0(0.0)	0(0.0)	1(2.0)	14(24.0)
>10yrs	11(22.0)	5(10.0)	2(4.0)	18(32.0)	5(10.0)	8(16.0)	2(4.0)	1(2.0)	0(0.0)	16(32.0)
Total	20(40.0)	16(32.0)	7(14.0)	43(86.0)	12(24.0)	14(24.0)	2(4.0)	1(2.0)	1(2.0)	30(60.0)
Chi square (p- value)	2.67(0.26)				4.51(0.34)					

*Number in parenthesis indicates percentage * significant at 5% level of significance **significant at 1% level of significance*

The results among nurses of government hospitals indicates that there was no significant association between pregnancy outcome and number of shift change in first *(p=0.36)* and second *(p=0.57)* pregnancy. There was no significant association found between pregnancy outcome and frequency of night shift rotation in first *(p=0.44)* and second pregnancy *(p=0.23)*. Moen *et.al* (2014) reported that there has no association found between spontaneous abortions and the number of worked night shifts. Positive associations were however reported by Salihu *et.al* (2012). No

significant association was seen between pregnancy outcomes and years of experience in first

(p=0.26) and second *(p=0.34)* pregnancy.

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Table 5: Association of shift variables and pregnancy outcome in nurses from private hospitals (n=50)

Shift Variables	First pregnancy*				Second pregnancy**			
	Normal Delivery	C-Section	Miscarriage / Abortion	Total	Normal Delivery	C-Section	Miscarriage /Abortion	Total
No: of shifts change/month 1-3	9(18.0)	7(14.0)	1(2.0)	17(34.0)	3(6.0)	1(2.0)	2(4.0)	6(12.0)
4-6	15(30.0)	7(14.0)	4(8.0)	26(52.0)	8(16.0)	5(10.0)	5(10.0)	18(36.0)
Total	24(48.0)	14(28.0)	5(10.0)	43(86.0)	11(22.0)	6(12.0)	7(14.0)	24(48.0)
Chi square (p- value)	1.48(.47)				0.30 (.86)			
No: of night shift rotation /month 2	19(38.0)	12(24.0)	4(8.0)	35(70.0)	8(16.0)	6(12.0)	6(12.0)	20(40.0)
3	5(10.0)	2(4.0)	1(2.0)	8(16.0)	3(6.0)	0(0.0)	1(2.0)	4(8.0)
Total	24(48.0)	14(28.0)	5(10.0)	43(86.0)	11(22.0)	6(12.0)	7(14.0)	24(48.0)
Chi square (p- value)	0.26(0.88)				4.02(0.13)			
Year of experience Up to 10yrs	12(24.0)	11(22.0)	3(6.0)	26(52.0)	5(10.0)	3(6.0)	6(12.0)	14(28.0)
>10yrs	12(24.0)	3(6.0)	2(4.0)	17(34.0)	6(12.0)	3(6.0)	1(2.0)	10(20.0)
Total	24(56.0)	14(28.0)	5(10.0)	43(86.0)	11(22.0)	6(12.0)	7(14.0)	24(48.0)
Chi square (p- value)	3.02(0.22)				3.08(0.21)			

Number in parenthesis indicates percentage ** significant at 5% level of significance*

***significant at 1% level of significance*

Analysis of data reveals that among respondents of private hospitals, there was no significant association between pregnancy out come and number of shift change *(p*=0.47; p**=0.86);* frequency of night shift rotation *(p*=0.88; p**=0.13)* and years of experience *(p*=0.22; p**=0.21)* in the first and second pregnancy of respondents. Those who had abortions and miscarriages in both sectors were doing shift works during their pregnancy period. A clear cut association can be established from a larger data.

4. Conclusion

The study contributed to highlight the reproductive health and pregnancy outcomes of female nurses working in government and private hospitals in Thiruvananthapuram, Kerala, India. It explored various aspects including menstrual patterns, reproductive health problems, and pregnancy outcomes, shedding light on the potential impact of shift work on these parameters. The findings revealed that a significant proportion of nurses experienced regular menstrual cycles, with a majority exhibiting normal bleeding patterns. However, a notable percentage faced reproductive health issues such as dysmenorrhoea and gynaecological problems. Regarding pregnancy outcomes, a considerable portion of nurses encountered poor outcomes, including miscarriages, abortions, and cesarean deliveries, though the majority delivered babies with a healthy birth weight. Interestingly, the study did not find a significant association between shift work variables and pregnancy outcomes, contrary to some previous research suggesting a link between shift work and adverse reproductive health events. Despite the lack

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of a clear-cut association in this study, the findings underscore the importance of continued research and interventions to support the reproductive health and well-being of female nurses amidst the demands of their profession.

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