**Preterm labor management: A narrative review**

**Abstract**

Giving birth is a beautiful experience & greatest achievement for a women. And also everything is needed to be accomplished in appropriate time to avoid the consequences. As like in preterm labor, where the labor occurs before the 37th completed weeks is associated with various maternal & neonatal complications. As per statistics about 28% of the neonatal death occurs due to preterm birth & the prevalence of preterm labor worldwide is around 11.5%. There are a lot many causes to it including preterm rupture of membranes (30%), urinary tract infections during pregnancy (35.8%), history of abortion (19.9%) and unplanned pregnancy (18.1%). But fortunately there are preventive measures like daily uterine activity monitoring, adequate bed rest and hydration, use of polar bear position & vitamin C supplementation. If those fails pharmacological treatment measures (tocolytics, Prostaglandin Inhibitors & Calcium Channel Blockers, Antibiotic therapy) can be used. However, the treatment & preventive measures is still a topic of debate. Also nurses has a pivotal role in handling the mothers with consequences.

**Key words:** preterm labor, PROM, tocolytics, polar bear position.

**Highlights of the study**

* There is increased Incidence of preterm labor in developing countries till date
* Out of many causes antenatal infections & PROM contributes to most
* Daily home uterine monitoring is the best option for the prevention of preterm labor
* Both pharmacological & non- pharmacological treatment options are available, yet require more research evidence for clinical practice

**Objectives of the Review**

The basic objective of this is to discuss precisely regarding the various aspects of the preterm labor & the research evidences available to support the same, so that the accurate measure can be used in the clinical setting.

**Introduction:**

Pregnancy brings a new meaning to the concept of beauty. It is a period of immense joy coupled with excitement. **(Hakim A, 2017).** Giving birth is an ecstatic jubilant adventure not available to males. It is a woman’s crowning creative experience of a lifetime. Furthermore, it is not uncommon for women to experience problems during pregnancy & labour that require medical care and intervention. **(Stevenson J, 2017)**

Preterm labor is one where the labor starts before the 37th completed week, counting from the first days of the last menstrual period **(Dutta D C,2004** **)**. This is a major determinant of neonatal morbidity and mortality .

**Grave of the problem**

Children who are born prematurely have higher rates of cerebral palsy, sensory deficits, learning disabilities and respiratory illnesses compared with children born at term. The morbidity associated with preterm birth often extends to later life, resulting in enormous physical, psychological and economic costs. **(Petrou S, Mehta Z, 2003).** And as per statistics, all early neonatal deaths (deaths within the first 7 days of life) are not related to congenital malformations, rather 28% are due to preterm birth**.(Lawn JE, Wilczynska-Ketende K, 2006),** which is showed in a study conducted on prevalence and risk factors of pretrm birth in brazil with a focus to describe and quantify factors affecting spontaneous and provider-initiated preterm birth among 23,940 women by using three-level hierarchical methodology . Result reveals that the rate of preterm birth was 11.5 %﻿, (95 % confidence 10.3 % to 12.9 %), 60.7 % spontaneous - with spontaneous onset of labor or premature preterm rupture of membranes - and 39.3 % provider-initiated, with more than 90 % of the last group being pre-labor cesarean deliveries. Hence the high rate of prematurity in Brazil may be attributed to a high proportion of provider- initiated births, especially among women receiving private healthcare at childbirth. **(Leal M, Esteves-Pereira A, 2016).** Another systematic review showed the prevalence of preterm labor in Iran by using the databases of Thomson database (Web of Knowledge), PubMed/Medline, Science Direct, Scopus, Google Scholar, Iranmedex, Scientific Information Database (SID), Magiran, and Medlib were searched for articles in English and Persian language published between 1995 and 2014. Total 14 studies (out of 1370 publications) of all English/ Persian electronic literatures which studied & the prevalence of preterm labor in each province of Iran were included. The result shows the overall estimated prevalence of preterm labor in Iran was 9.2%. **(Vakilian. K, Ranjbaran. M, 2015)**. Therefore preterm labor has increased prevalence & also add to other complicating factors.

**Possible grounds of preterm labour**

Approximately 45–50% of preterm births are idiopathic, 30% are related to preterm rupture of membranes (PROM) and another 15–20% are attributed to medically indicated or elective preterm deliveries. **(Haas DM & Pennell CE, Jacobsson B etal, 2006, 2007)**

**Factors responsible for Preterm labor**

# There are various factors which increases the risk of preterm labor which is publicized through a case-control study conducted on risk Factors of Preterm Labor in the West of Iran among 200 preterm infants (case group) and 400 term infants (control group) and the results revealed that abnormal amniotic fluid, premature rupture of membranes, double and multiple pregnancies, chronic hypertension, family history of premature birth, mothers age over 35 years, and cervical incompetence (P<0.05) had significant relationship with the premature birth. (Derakhshi B, Esmailnasab N etal, 2014). Similarly another case-control study in Iran conducted by taking 735 hospital records of pregnant mothers  with preterm labor (20–37 weeks) with the use of multi-stage cluster sampling. The result reveals that prevalence of preterm labor was 5.5% & the factors associated were genital-urinary tract infections during pregnancy (35.8%), PROM (30.3%), history of abortion (19.9%) and unplanned pregnancy (18.1%) (Roozben N, Moradi S etal, 2016)

# whereas in India a similar study conducted on risk factors of preterm birth among 790 pregnant women and the result shows the risk factors for this are Previous preterm delivery (ARR, 5.37; 95% CI, 1.5 to 19.1), periodontitis (ARR, 2.39; 95% CI, 1.1 to 4.9), Oligohydramnios (ARR, 5.23; 95% CI, 2.4 to 11.5), presence of Nugent’s intermediate vaginal flora (ARR, 2.75; 95% CI, 1.4 to 5.1), gestational diabetes mellitus (ARR, 2.91; 95% CI, 1.0 to 8.3), and maternal height <1.50 m (ARR, 2.21; 95% CI, 1.1 to 4.1). ([Tellapragada](https://www.ncbi.nlm.nih.gov/pubmed/?term=Tellapragada%20C%5BAuthor%5D&cauthor=true&cauthor_uid=27255075) C, [Eshwara](https://www.ncbi.nlm.nih.gov/pubmed/?term=Eshwara%20VK%5BAuthor%5D&cauthor=true&cauthor_uid=27255075) VK etal, 2016). Hence this can assumed that the risk factors for preterm labor are independent of the geographic location.

It has also been found out that in spite of the physical factors, psychological factors may also contribute to preterm labor which is proves through a prospective cohort study done to measure maternal stress & mood in relation to preterm birth by taking early second trimester (18-45 yr) women. Cortisol concentration was measured in maternal hair at 16, 28, and 40 weeks of gestation .The result shows high perceived stress among women in second trimester is associated with both elevated second-trimester hair cortisol concentration and gestational age at delivery leading to preterm birth. **(Hoffman MC, Mazzoni SE etal, 2016)**

**Clinical presentation of preterm labour**

According to a literature published in March of dimes in Aug,2017 shows the symptoms of preterm labor are as Change in vaginal discharge or more vaginal discharge than usual, downward Pressure in pelvis or lower abdomen, Constant low, dull backache, Regular or frequent contractions and leaking. The same has been proved through a study conducted by **Katz M, Goodyear K, Creasy RK, 1990** on early signs & symptoms of preterm labor by interviewing 100 women’s for the presence or absence of various symptoms and signs during the 7 days preceding to the diagnosis of preterm labor. The result shows increased uterine contractions, menstrual cramps, constant backache, constant pelvic pressure, increased amount and consistency and color change of vaginal discharge, and increased frequency of urination has high statistical significance among the preterm labor mothers.

**Prevention of preterm labor**

There are still ways to prevent preterm labor which is described through a study done on management of preterm labor patients at home: does daily uterine activity monitoring and nursing support make a difference?, where 67 successfully treated preterm labor patients were randomly assigned in this multicenter study for daily home uterine activity monitoring and perinatal nursing support or to a standard-care group. Result reveals the risk of preterm birth for patients with recurrent preterm labor was significantly reduced (P = .025) in the monitored group (7, or 47%) compared with the standard-care group (16, or 84%). Thus the data suggest that home uterine activity monitoring and perinatal nursing support are effective in achieving term birth through earlier detection and treatment of recurrent preterm labor. **(Watson DL, Welch RA,1990 )**

The same is also supported by another Randomised control trials on home uterine activity monitoring, with or without patient education programmes, for women at risk of preterm birth, compared with care that does not include home uterine activity monitoring was done by using data from Cochrane Pregnancy and Childbirth Group's Trials Register (30 June 2016), CENTRAL (Cochrane Library 2016, Issue 5), MEDLINE (1966 to 28 June 2016), Embase (1974 to 28 June 2016), CINAHL (1982 to 28 June 2016), and scanned reference lists of retrieved studies.  The result reveals no difference in the rate of perinatal mortality (RR 1.22, 95% CI 0.86 to 1.72; two studies, 2589 babies) (GRADE low) & preterm births at less than 37 weeks (average RR 0.85, CI 0.72 to 1.01; eight studies, 4834 women; random-effects, Tau2 = 0.03, I2 = 68%) (GRADE very low). But by using home uterine monitoring lessens the admission to neonatal intensive care unit (average RR 0.77, 95% CI 0.62 to 0.96; five studies, 2367 babies; random-effects, Tau2 = 0.02, I2 = 32%). **(Urquhart C, Currell R, etal, 2017)**. Hence it can be concluded that the home uterine activity monitoring is able to prevent preterm labor to some extent.

**Considered treatment regimen for Preterm labor**

1. **Activity Reduction and Bed Rest**

Increased level of cortisol (an important stress hormone) is correlated with increase risk of preterm labour. **(Berwald M, 2011).** Thus traditionally bed rest has been recommended to women at high risk for a preterm delivery, despite a lack of evidence in the literature to support its use.

Like a  Cochrane review done to evaluate the effect of bed rest in preventing preterm birth among pregnant women who are at high risk, found only one trial of 1,266 women for meta-analysis. Here 432 women were prescribed bed rest and 834 women received a placebo or no intervention. Preterm birth prior to 37 weeks was similar between groups (7.9% vs 8.5%; RR 0.92, 95% confidence interval [CI] 0.62–1.37).Thus regular physical activity and exercise during pregnancy is safe and does not increase the risk of preterm delivery. **( Sosa CG, Althabe F, 2016)**

Another study included in the Sosa et al review but not included meta-analysis as data for singleton pregnancies were not available. In the study, 73 women being treated for preterm labor with a negative fetal fibronectin test were randomized to activity reduction (AR) (bed rest with bathroom and shower privileges) or no AR that included resuming home and work activities. No significant differences in preterm birth rate were found between groups (preterm delivery rate 44.4% patients with AR and 35.1% patients without AR, P = 0.478). **(Elliott JP, Miller HS et al, 2005)**

In continuation to that another supportive prospective cohort study in the Netherland, evaluated association between physically demanding work and obstetric outcomes among 4,680 pregnant women, revealed no significant effects from long periods of walking, standing, lifting greater that 25 kg, nightshifts, and long work hours on the occurrence of preterm birth. Thus it concluded that women who do physically demanding jobs tend to be healthier prior to conception and may therefore be at lower risk for adverse obstetric outcomes. **(Snijder CA, Brand T, et al, 2012)**

Hence due to a lack of empirical evidence, recommendations for work activity during pregnancy remain a challenge for obstetricians.

1. **Adequate hydration**

Adequate hydration is considered as a treatment for women with preterm labour. Theoretically, hydration may reduce uterine contractility by increasing uterine blood flow and by decreasing pituitary secretion of antidiuretic hormone and oxytocin. Thus prevents preterm labor. **(D C Dutta,2004 )**

 Thus for proving the same a Randomised controlled trial done on hydration for treatment of preterm labor, which include228 women with pregnancy less than 37 completed weeks of gestation and presenting with preterm labour, compared with intravenous or oral hydration with no treatment. Information were collected from Cochrane Pregnancy and Childbirth Group's Trials Register (30 September 2013) and bibliographies of relevant papers. The study resulted that Risk of preterm delivery, before 37 weeks (RR) 1.09; 95% confidence interval (CI) 0.71 to 1.68), before 34 weeks (RR 0.72; 95% CI 0.20 to 2.56) or before 32 weeks (RR 0.76; 95% CI 0.29 to 1.97), was similar between groups. Therefore Intravenous hydration does not seem to be beneficial, even during the period of evaluation soon after admission, in women with preterm labour. **(Stan CM, Boulvain M, etal, 2013).** As a result to which adequate hydration seems to become controversial for preterm labor management , which may require further studies before acceptance.

1. **Practice polar bear position**

Posture plays vital role in pregnancy.physician suggest “polar bear position” to pregnant mothers for relaxing their cervix by removing pressure from it. Thus it reduces the chance of preterm labor. **(Arora R, 2015)**

1. **Vitamin C supplementation**

Eating a diet rich in vitamin C helps to keep the amniotic sac intact longer, so eating an orange a day is a wholesome habit.

# But as per the research statistics the use of vitamin C for prevention of preterm labor becomes a topic of controversy. Because as per a clinical trial on The Role of Vitamin C in Prevention of Preterm Premature Rupture of Membranes was performed among 170 pregnant women with the history of PPROM, with singleton pregnancy and gestational age 14 weeks at Imam-Reza Hospital, Mashhad University of Medical Sciences. Each case patient received 100 mg vitamin C daily from 14th weeks of gestation. PPROM occurrence is 44.7% in control group and 31.8% in case group (P &lt; 0.05). PROM occurred in 34.1% in control group and 18.8% in case group (P &lt; 0.05). Hence Vitamin C supplementation after 14th weeks of gestation can prevent PPROM in women with the history of PPROM. ([Ghomian](https://www.ncbi.nlm.nih.gov/pubmed/?term=Ghomian%20N%5BAuthor%5D&cauthor=true&cauthor_uid=23682322) N  [Hafizi](https://www.ncbi.nlm.nih.gov/pubmed/?term=Hafizi%20L%5BAuthor%5D&cauthor=true&cauthor_uid=23682322) L, 2013)

# Whereas in another Literature Review in [Cochrane database](https://www.researchgate.net/journal/1361-6137_Cochrane_database_of_systematic_reviews_Online) ((31 March 2015)) on Vitamin C supplementation in pregnancy shows the opposite, where total 29 trials involving 24,300 women are included. Result shows no clear differences between women supplemented with vitamin C alone or in combination with other supplements compared with placebo or no control for the risk of stillbirth, neonatal death, perinatal death, birthweight, intrauterine growth restriction, preterm birth (average RR 0.99, 95% CI 0.90 to 1.10; 22,250 participants; 16 studies; I² = 49%; high quality evidence), preterm PROM (prelabour rupture of membranes) (average RR 0.98, 95% CI 0.70 to 1.36; 16,825 participants; 10 studies; I² = 70%; low quality evidence), term PROM (average RR 1.26, 95% CI 0.62 to 2.56; 2674 participants; three studies; I² = 87%), and clinical pre-eclampsia. Hence further research is required to evaluate the possible role of vitamin C in the prevention of preterm labor and prelabour rupture of membrane. (Rumbold A, Ota E, etal, 2015)

1. **Tocolytic Agent**

Tocolytics has its own effectiveness in treating preterm labor since long decades. Which is supported by a study on Success rate in preterm uterine contraction inhibition with tocolytic agents in a tertiary care center was conducted among among 424 pregnant women diagnosed with preterm labor or threatened preterm labor with a aim to delay delivery by 48 hours. The result shows Overall success rate of preterm uterine contraction inhibition to prolong pregnancy for at least 48 hours was 86.4% (95% confidence interval [CI]: 78.3, 92.3) and was 93.8% among the threatened preterm labor group. Which means the preterm uterine contraction inhibition with tocolytic agents to delay delivery for at least 48 hours was high in threatened preterm labor and low in preterm labor. **(Kiatsuda D, Thinkhamrop J, 2016)**

In continuation to that another randomized control trial done to compare the 3 tocolytics (intravenous M, oral N, or I suppositories) for preterm labor management among 301 women. The result reveals no differences in efficacy or in major maternal safety issues between these three agents. Thus clinicians must use the tocolytic which is afforded & has best result with the least maternal/neonatal side effects. **(Klauser. CK, Briery. CM etal, 2013)**

1. **Prostaglandin Inhibitors & Calcium Channel Blockers**

Systematic review & network meta analysis was conducted by using Cochrane central register of controlled trials, medline, medline in- process, embase & CINAHL up to 17 feb,2012 with a aim to identify the most effect tocolytic agent in delaying delivery. The result shows prostaglandin inhibitors & calcium channel blockers had the hightest probability in delaying delivery & also improves the neonatal & maternal outcome. **(Haas. DM, Caldwell. DM, 2012)**

1. **Antibiotic therapy**

According to ACOG guideline antibiotics should not be used to prolong gestation or improve neonatal outcomes in women with preterm labor and intact membranes. **(United healthcare policy, 2018)**

**Future consequences**

For showing the future consequences a study on pregnancy complications among women born prterm was conducted by **Boivin A, Luo Z C etal, 2012** by taking 7405 women born preterm (554 < 32 weeks, 6851 at 32–36 weeks) and a matched cohort of 16 714 born at term between 1976 and 1995 who had a live birth or stillbirth between 1987 and 2008.  The results reveals that pregnancy complications associated with preterm birth was increased by 1.95-fold (95% confidence interval [CI] 1.54–2.47) among women born before 32 weeks’ gestation and 1.14-fold (95% CI 1.03–1.25) among those born at 32–36 weeks’ of gestation compared to women born at term. Thus being born preterm increases the risk of having pregnancy complications in future life.

**Conclusion**

The prevalence of preterm labor has increased since the last decade throughout the world. In addition to that the birth of a preterm infant results in significant health consequences not only to the infant but also the emotional and economic costs for families and communities also. Although advances in perinatal and neonatal care have improved the survival for preterm infants, but the survivors have a greater risk of developmental disabilities, health, and growth problems than infants born at full term. Therefore prevention is the best aspect to avoid the worst future outcomes. And in this nurses role is very crucial. Also we should not overlook the controversial issues regarding the preterm labor management modalities and for this further reviews are essential.

**Conflict of Interest:** None

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