
Active Versus Traditional Management of Labor: A Prospective Randomized Study

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Abstract:

Objective: The aim of this study is to explore the effect of active management of labor on the course of labor, prenatal outcomes and the rate of cesarean sections.

Sitting: This study was conducted in Tripoli Medical Center from February 2005 to November 2006 and included 300 nulliparous women in spontaneous labor, at term with a singleton fetus in cephalic presentation.

Material and Methods: Active phase of labor was defined when labor pains were regular, at least 2 contractions per 10 minutes, each contraction lasts for 45 seconds or more, with cervical dilatation more than 3cm. Cases with multifetal pregnancy, preterm fetus, non cephalic presentation, cervical dilatation >8cm on admission, obvious cephalopelvic disproportion, contracted outlet, fetal congenital anomalies, estimated fetal weight 2500g, spontaneous or induced rupture of membranes before admission, maternal medical disorder with pregnancy, antepartum hemorrhage as well as mother unsure of date, were all excluded.

Randomization: Study participants were randomized to active management of labor and traditional management, each group involved 150 participants. **Result:**

A partogram was constructed for each case under the study to compare the prenatal outcome in both groups. The mean duration of labor was less in active management group and cesarean section rate was not significantly different from the other group.

Conclusion: Active management does not decrease the cesarean section rate, and is as good as traditional management with respect to prenatal outcome, and it also saves time and effort of the attending physician.

Key words: Labor, Diagnosis, traditional management, active management.

Introduction:

During the past 20 years of obstetric practice in the United States, there has been an alarming increase in the rate of cesarean deliveries. The 1970 cesarean section rate in the United States was 5.5%, more than quadrupled over the last two decades without an appreciable change in the prenatal mortality rate.¹

The majority of this increase has been in the number of cesarean sections performed on nulliparous patients for dystocia and as repeat cesarean section in multiparous women. Any intervention aimed at reducing the first indication would by definition lead to a reduction in the second. With the assumption that inefficient uterine action is largely responsible for dystocia.

Active management of labor, introduced in Ireland by O'driscoleta² is associated with a low rate of abdominal deliveries in low-risk nulliparous patients.

Unlike the use of low-dose oxytocin proposed by Seitchik and Castillo³ and recommended by

American College of Obstetricians and Gynecologists,⁴ active management of labor uses a relatively high dose of oxytocin and also espouses the use of early amniotomy once the diagnosis of labor is established.

Active management of labor is a well documented protocol introduced in practice in 1960's at the National Maternity Hospital in Dublin for the management of spontaneous labor in nulliparous women with aim of reducing the incidence of prolonged labor and diminishing the rate of cesarean sections in this category of patient. Active management of labor refers to active control rather than passive observation over the course of labor by the obstetrical provider.

There are three essential elements in active management;

1. Careful diagnosis of labor start.
2. Constant monitoring of labor progress.
3. Prompt intervention. (e.g. Amniotomy, high dose oxytocin) according to established guidelines if progress is unsatisfactory.

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Labor is defined as a coordinated effective sequence of involuntary uterine contractions that result in effacement and dilatation of the cervix and voluntary bearing down efforts leading to the expulsion per vagina of the products of conception.

Labor commonly is divided into 3 stages:

1. The first stage begins with the onset of labor and ends when dilatation of the cervix (10 cm) is complete. This is usually the longest stage of labor.

The average duration of the first stage of labor in a primigravida is 8-12 hours and in a multiparous 6-8 hours.

2. The second stage of labor extends from full dilatation of the cervix to the birth of fetus and varies from a few minute to about two hours depending on both fetal and maternal factors.

3. The third stage of labor is the period from the birth of the infant to delivery of the placenta. The hour immediately after delivery of the placenta during which time

the danger of P.P.H is greatest is often referred to as the fourth stage of labor.

The principles of active management of labor which was developed at National Maternity Hospital in Dublin are, diagnosis of labor based either on painful contractions and/or cervical dilatation and effacements. One hour after admission, progress is assessed and amniotomy performed; cervical dilatation must advance by at least 1 cm per hour. Oxytocin is started and increased until mother has 5-7 contractions every 15 minutes. Maximum labor length is 12 hours; a midwife stays with each women.

Friedman's analysis of labor (lass),^{6,7} have influenced intrapartum care to these days, he described a " Latent Phase" which can last up to 15 to 20 hours in primiparous women and consists of cervical effacement and dilatation up to 4 cm, followed after a period of acceleration, by an active phase of maximum cervical dilatation of > 1.2 cm/h. There is often slow in cervical dilatation "Deceleration Phase" before the second stage of labor begins.

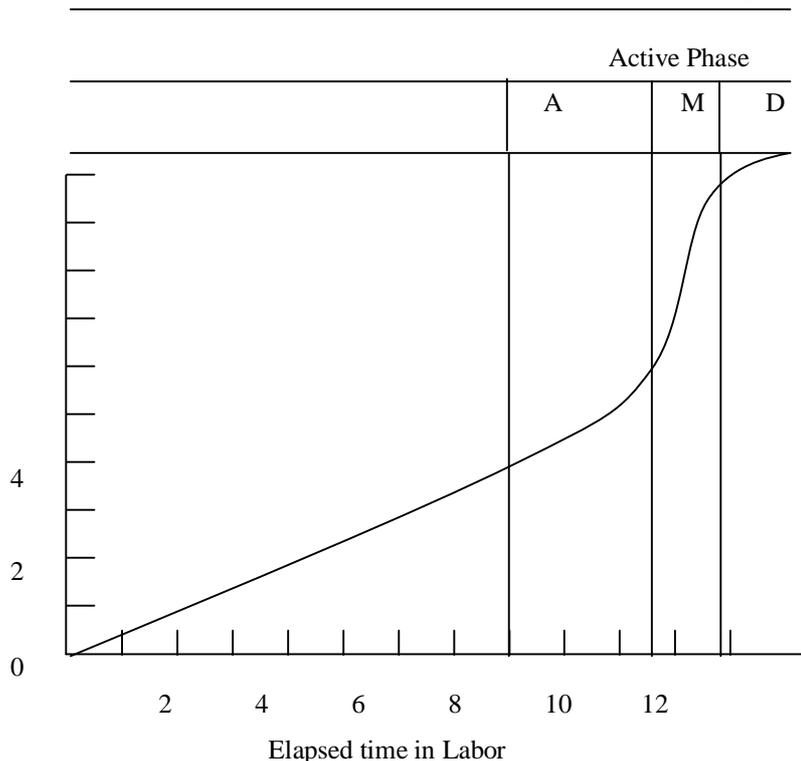


Figure 1-1: Dilatation of the cervix at various phases of labor (primiparous).
A: Acceleration Phase. M: Phase of maximum slope. D: Deceleration Phase.

An appropriate partogram reflects the inclusion criteria of parturients, the admission dilatation, and the clinician's variable criteria for intervention. Labor is to be graphed and

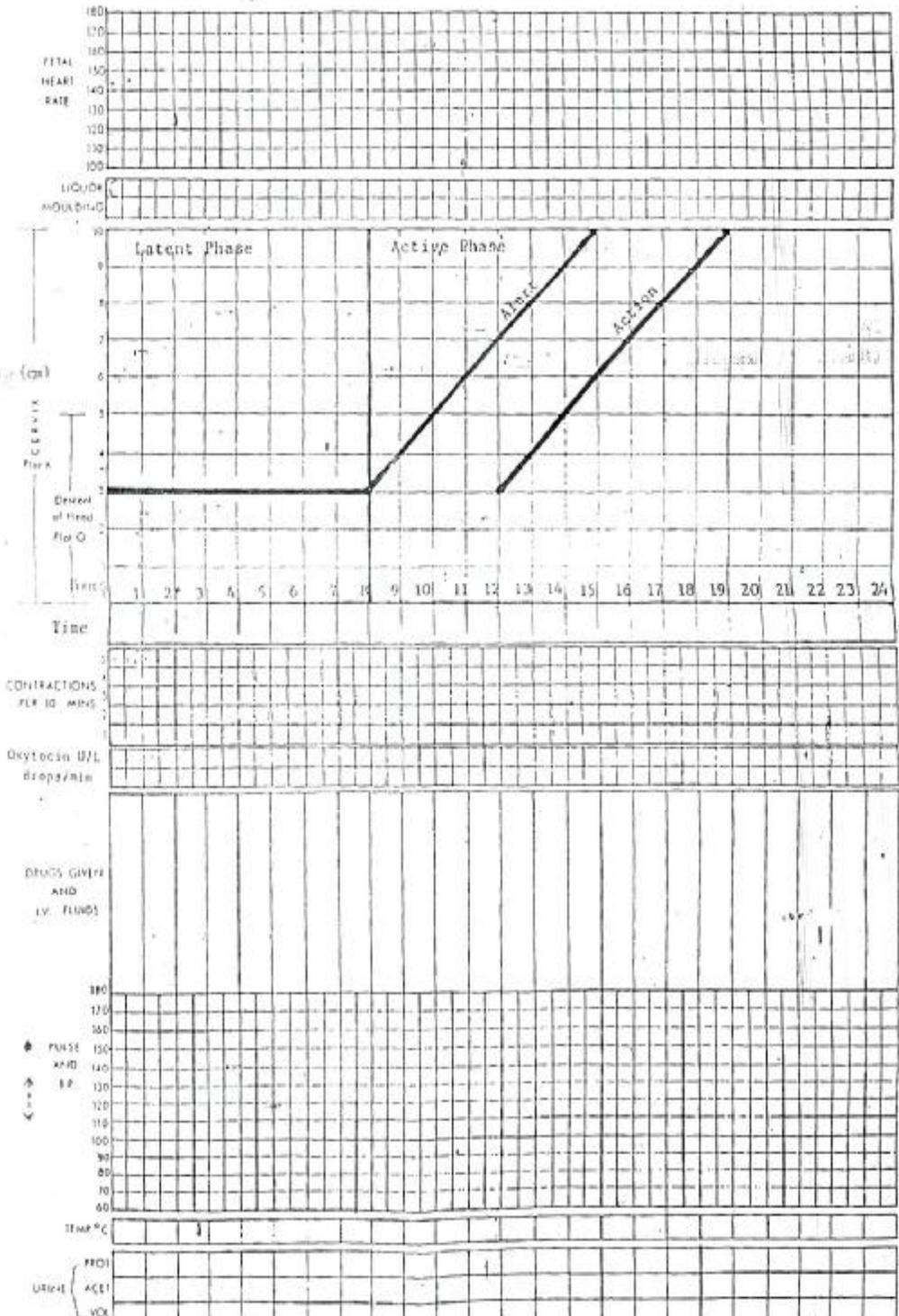
analysis includes the use of alert and action lines.

A 4-hours wait (lag time) is recommended before intervention; when the active phase is slow. (Partogram) **Figure 1-2.**

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أمانة العامة للتربية الصحية والعائلي الإنجابي
مركز بحوث طب أمراض النساء

Name..... Gravida.... Para.....Hospital No.
Date of admission Time of admission..... Ruptured membranes hrs



Creation of a representative mean partogram requires a consecutive cohort of women in spontaneous labor, subjects either scheduled to no intervention just observation, or to judicious acceleration of labor by amniotomy with or without oxytocin in what is known as active management.

Materials and Methods:

This randomized prospective study was carried out at the Tripoli Medical Center which is a tertiary referral university institution that publishes an annual clinical report, which includes detailed data on obstetric outcome and mode of delivery on all mothers who have been delivered and all prenatal deaths.

The study period extended from February 2005 till November 2006. Eligible patients included nulliparous women at term pregnancy (completed 37 weeks calculated from the first day of last menstrual periods), singleton pregnancy, cephalic presentation who had painful, palpable uterine contraction ≤ 5 minutes apart with cervical effacement of at least 80% and cervical dilatation of $\geq 3-4$ cm. Patients were excluded if they had multi-fetal pregnancy, preterm fetus, non cephalic presentation, and cervical dilatation >8 cm on admission, contracted outlet, obstructed labor on admission, and fetal distress on admission, fetal congenital anomalies, estimated fetal weight <2500 g, spontaneous or induced rupture of membranes before admission, maternal medical disorders with pregnancy, and antepartum hemorrhage as well as mother unsure of date were all excluded from the study.

Randomization:

Study participants were randomized to either active management of labor or traditional management groups, each group consisting of 150 participants.

Active management protocol:

Once the mother is admitted to the labor ward, she was examined obstetrically to record initial values; uterine contractions, cervical status, station, and fetal heart sounds which were plotted on a partogram. The World Health Organization,² two line partogram (an alert line and an action line after 4 hours interval) was used. Amniotomy through fore water rupture was done on cervical dilatation of 5 cm or more that is usually achieved 2 hours and data

were plotted on the partogram. When the alert line was touched or crossed, the attending obstetrician reassesses fetal wellbeing and cephalopelvic dis-proportion. If neither were present, oxytocin infusion was given. Oxytocin was prepared in a concentration of 10 IU/L and given by IV infusion in a dose of 6 m IU/min increased every 20 minutes till achieving 3 uterine contractions every 10 minutes, each lasts for at least 45 seconds. The maximum dose was set at 40 mIU/min. if no proper cervical dilatation was observed for the foregoing 2 hours (1cm per hour) cesarean section was indicated. Analgesia was prescribed when needed. If obstructed labor (though the presence of +3 molding with poor cervical dilatation) or fetal distressed (through recurrent late deceleration bouts on the monitor) was diagnosed at any time, cesarean section was immediately indicated.

Dystocia was defined as difficult labor. It may be associated with various abnormalities that prevent or deviate from the normal course of labor and delivery. These abnormalities are classified into three general categories that are often interrelated; e.g. a contracted pelvis may increase the likelihood of fetal mal-presentation. Mal-presentation or excessive fetal size may be related to ineffective uterine action. Disproportion between pelvic architecture and the presenting part often accompany uterine dysfunction. All patients who were assigned the diagnosis of dystocia attained at least 5 cm of cervical dilatation.

Fetal intolerance of labor was defined as either repetitive late decelerations or repetitive severe variable decelerations of the fetal heart rate. Decelerations defined as fall in fetal heart rate in relation to a uterine contraction. The amplitude of the deceleration in beats/minute is the difference between the basal fetal heart rate recorded preceding the dip and the minimum fetal heart rate recorded at the bottom of the dip. The lag time (in seconds) is the interval between the peak of the contraction and the bottom of the corresponding deceleration. These decelerations are of three types, early, late, and variable.

A diagnosis of fetal intolerance of labor was made only after attempts at correction of the fetal heart rate pattern with hydration, uterine displacement and oxygen administration. Meconium staining of the amniotic fluid at the time of membrane rupture was subjectively

quantified by the attendant as either thick or thin. Uterine hyper-stimulation was defined as the occurrence of uterine contractions every \leq 1 minute or of $>$ 2 minutes duration.

Statistical analysis:

Quantitative data were described using the terms of mean \pm SD while categorical data were described using the frequency (number of cases) and percentage. Comparison of quantitative variables was done using Student's test for independent samples. Comparison of categorical data was done using the Chi squared (χ^2) test. Yates correction equation was used when any of the expected values $<$ 5. A probability value (p value) $<$ 0.05 was considered statistically significant. Statistical calculations were done using SPSS (Statistical

Package for the Social Science; SPSS Inc., Chicago, IL, USA) statistical program.

Results:

A total of 300 nulliparous mothers were recruited in this study. Participants were divided into 2 groups, active management of labor (150 mothers) and traditional management (150 mothers) to compare labor characteristics and prenatal outcome.

Fig 1: shows the demographic characteristic of the studied groups. The mean age in active management group was 28.4 ± 4.98 years with a mean gestational age of 38.97 ± 2.81 , while in traditional management group the mean age was 27.46 ± 4.02 with a mean gestational age of 39.16 ± 2.92 .

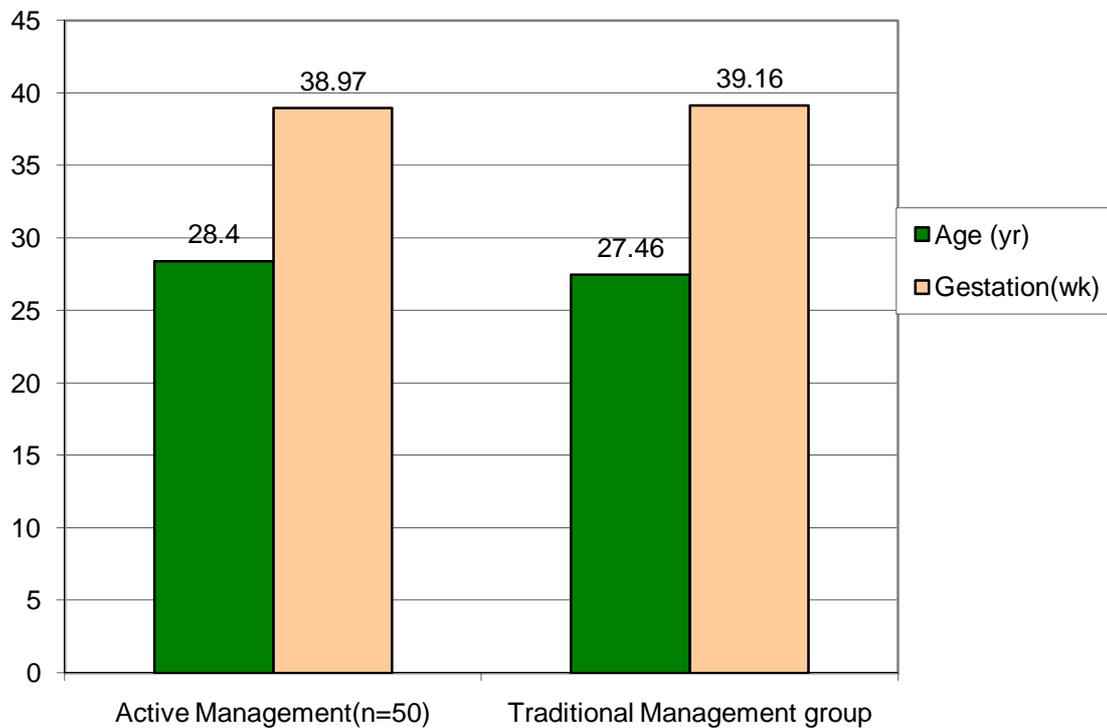


Fig 1: Patient demographics.

Fig 2, 3, and 4: show the labor characteristics of the studied group. Regarding effacement, about one third of the participants had partially effaced cervix while in about two thirds of cases, the cervix was well effaced. The mean cervical dilatation in active management group

was 4.53 ± 0.81 cm and it was 4.61 ± 0.76 cm in traditional management group. About three fourths of cases in both groups had non engaged head and none had a station of -3. Statistical comparison showed no significant difference in any of the studied variables.

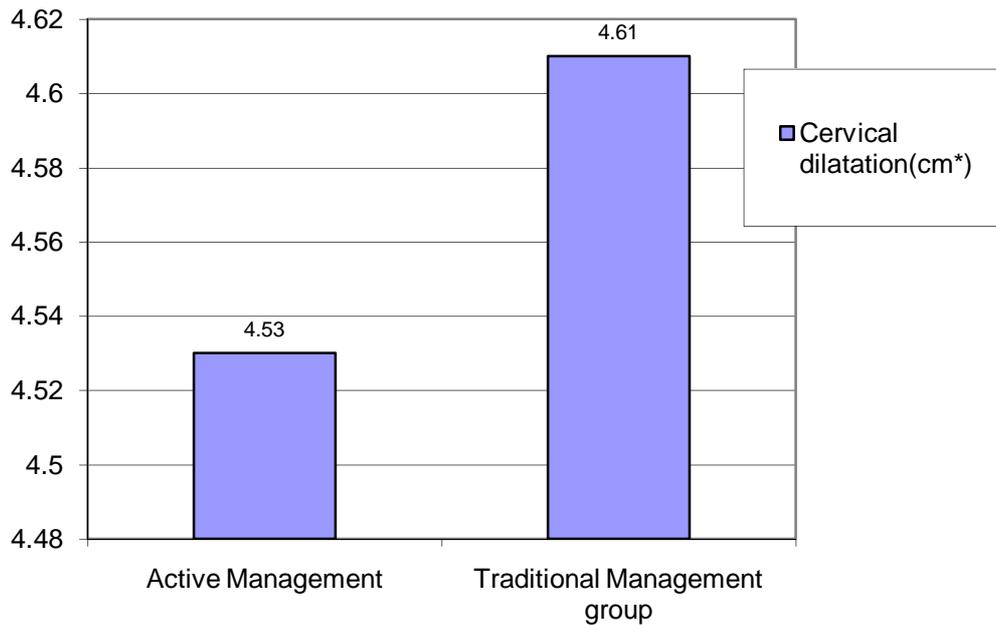


Fig 2: Cervical dilatation (cm*).

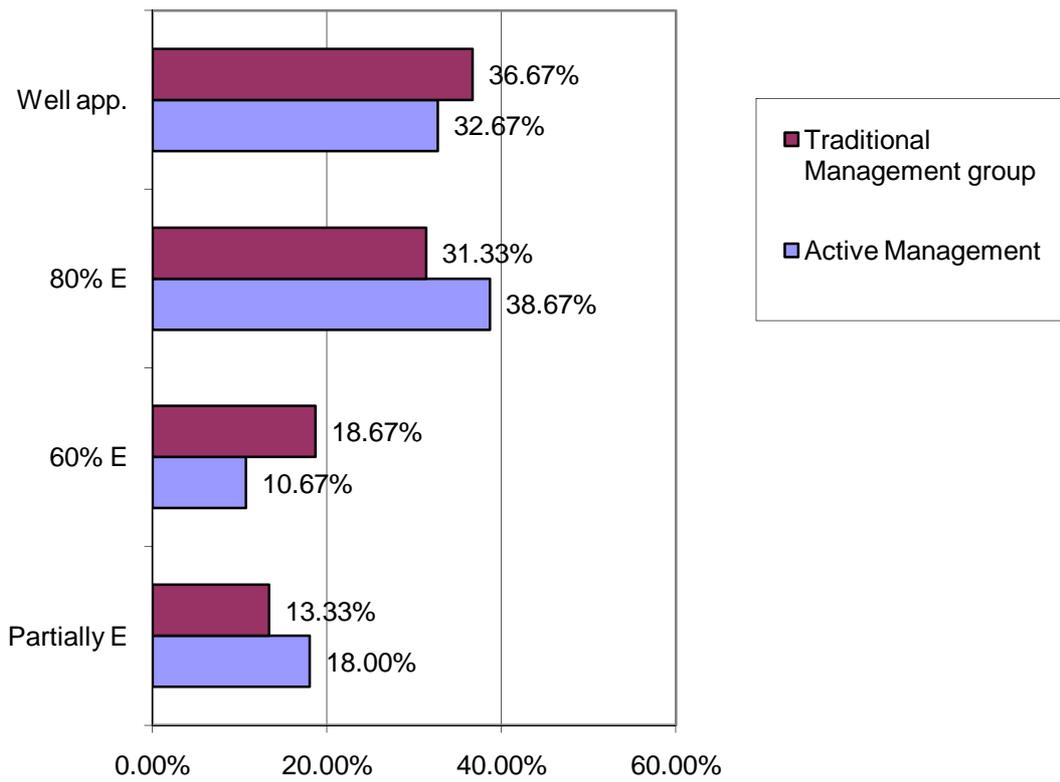


Fig 3: Effacement+

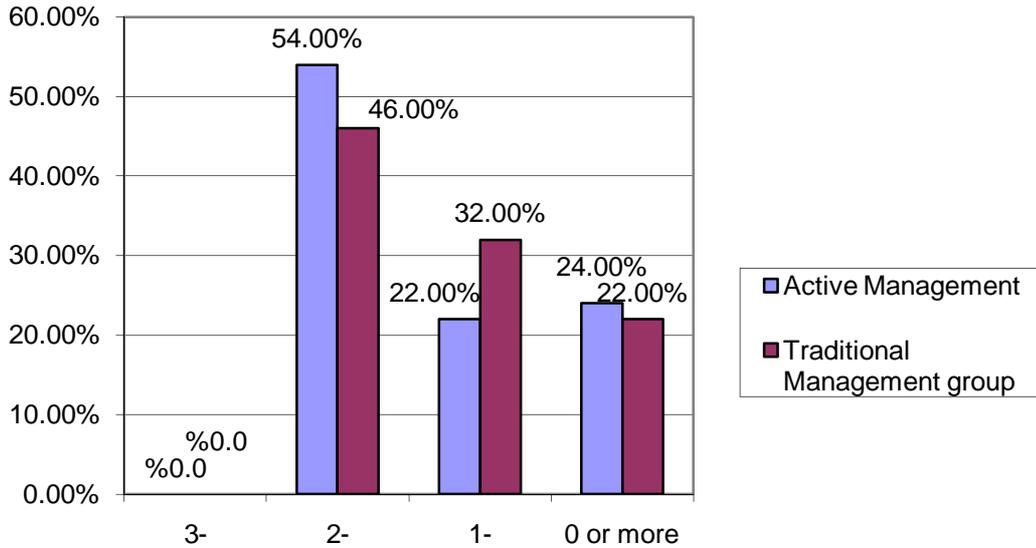


Fig 4: Station+

Fig 5: shows duration of labor from admission time to time of delivery. It was significantly short in the active management group than the

traditional group (9.7 ± 4.9 versus 11.4 ± 5.01 respectively)

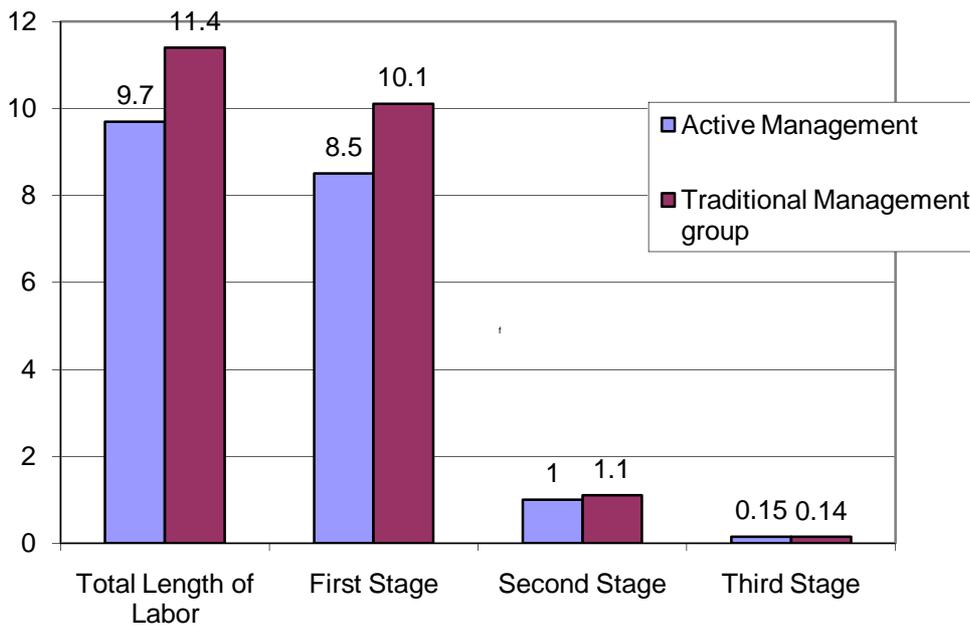


Fig 5: Length of labor (minutes) Total Length of Labor.

Fig 6: shows the labor outcome. Thirty two cases (15.33%) of the active group and 19 cases (12.67%) of the traditional management group experienced instrumental delivery. Episiotomy was done in 96 cases (64%) and 88 cases (58.67%) respectively and cesarean delivery was indicated in 36 cases (24%) and

31 cases (20.67%) respectively. No statistical significance was found between both groups. Regarding the total maternal blood loss, both groups were similar. The mean maternal blood loss in the active management group was 196 ± 62.7 ml whereas 201.6 ± 56.9 ml in the traditional management group.

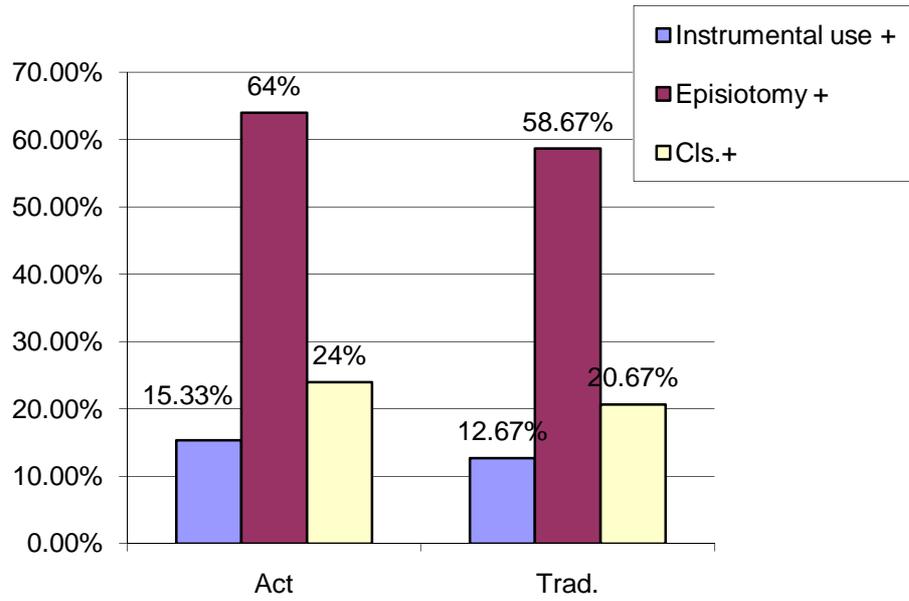


Fig 6: Show Labor Outcome.

Fig7-10: shows neonatal outcome, both groups were also matched regarding to the neonatal birth weight (3409 ± 309.4 in active management group and 3445 ± 329.7 in traditional management group), APGAR score at one minute (6.89 ± 1.03 versus 9.21 ± 0.72 respectively), APGAR score at 5

minutes (9.19 ± 0.76 versus 9.21 ± 0.72 respectively), frequency of APGAR score < 7 at one minute (15.33 % versus 17.33 % respectively) or at 5 minutes (4.% versus 2.67% respectively) and neonatal ICU admission (2.67 %) in both groups.

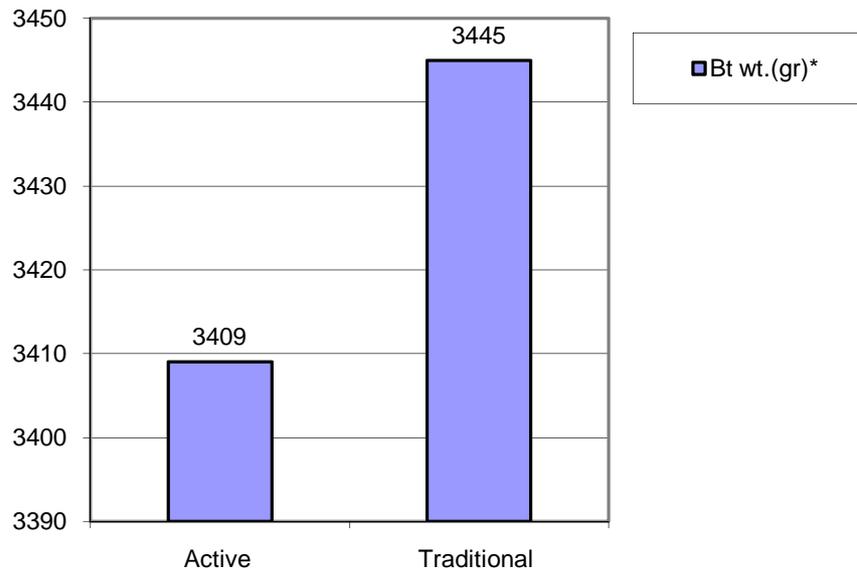


Fig 7: Bt wt.(gr)*

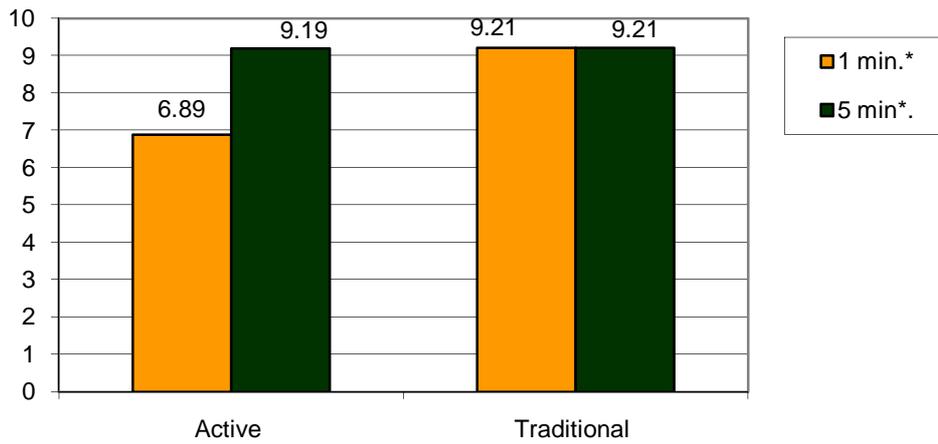


Fig. 8: APGAR score

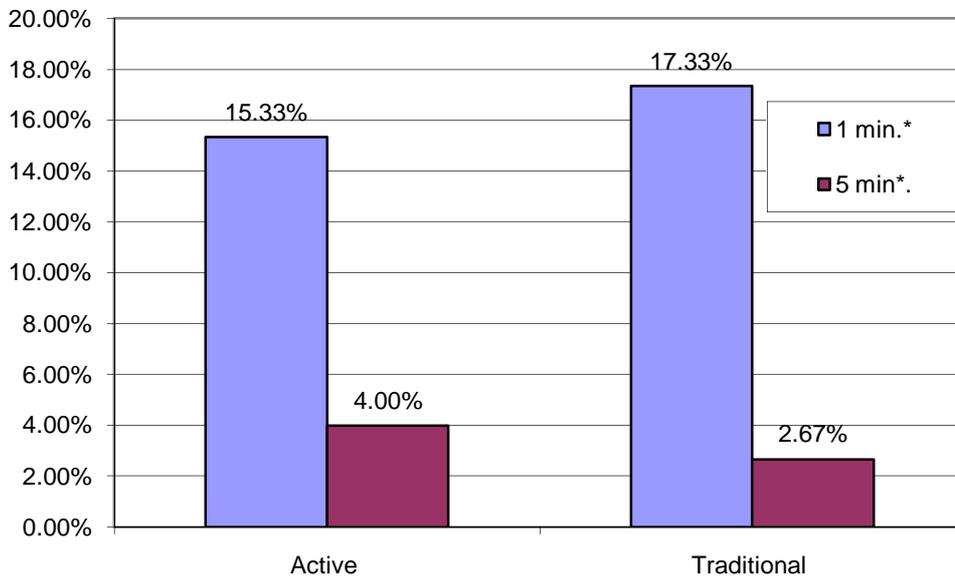


Fig. 9: Frequency of APGAR Score < 7

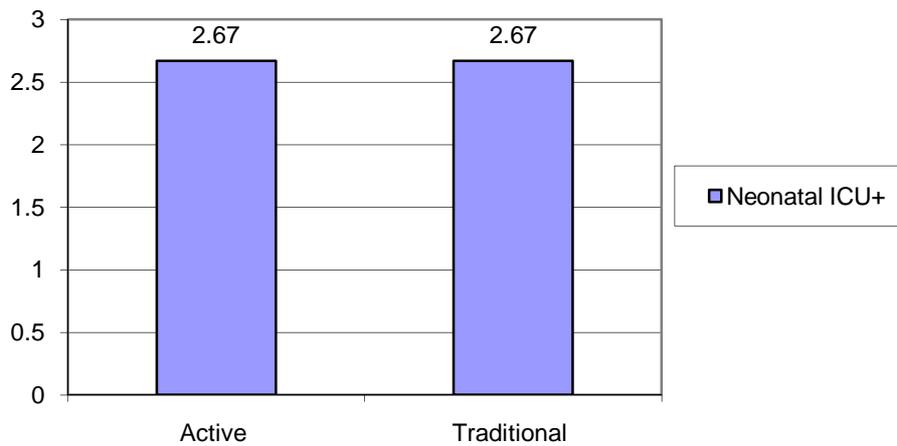


Fig. 10: Neonatal ICU+

Discussion:

For more than 25 years, active management of labor has been successfully used at the national Maternity Hospital in Dublin according to the protocol instituted by O'Driscoll et al.² The basis of active management rests on the tenets of an accurate diagnosis of true labor, early amniotomy and selective use of high-dose oxytocin, limitation of the total duration of labor to 12 hours and supportive maternal, intrapartum care and antenatal education.

In 1984 O'Driscoll et al⁶ investigated a group of 8742 women who all underwent active management of labor, of whom 3106 were nulliparous and 5636 were multiparous. The cesarean section rate was 5.5% for the nulliparous women and 2.8% among the multiparous ones. They ascribed the higher rate of dystocia in the nulliparous patients to inadequate uterine activity and the need to overcome the increased soft tissue resistance of the untried birth canal. They touted oxytocin as the only reasonable alternative to cesarean section.

Other investigators have further evaluated active management of labor as described by O'Driscoll et al. Four of these studies used historic controls and did not randomize patients.⁹⁻¹² An analysis of these retrospective studies reveals significant decreases in the cesarean section rates and modest declines in the rates of operative vaginal deliveries.

Not all studies commented on lengths of labor, but in those that did, patients in the active management groups had shorter overall durations of labor, most notably in first stage labor. None of the studies showed any increase in the incidence of poor neonatal outcome in the patients who received active management. Satin et al¹³ noted that a given patient's response to the dosage of oxytocin was highly variable and precluded prediction of the mode of delivery, implying that other factors beside oxytocin may account for the favorable outcome noted in these studies.

The definition of the normal upper limit to labor has been reduced from 36 hours in the 1950s to 24 hours in the 1960s to 12 hours in 1972 when active management was introduced. In describing active management, one of its practitioners says: "Twelve hours is considered the maximum safe duration of spontaneous labor and cesarean section is performed unless

delivery is imminent at that time" (O'Herlihy 1993).¹

Research by (Fraser in 1992)³ has shown that amniotomy alone does not reduce cesarean section rates, and another meta-analysis of research (Fraser 1992b) shows that oxytocin alone does not reduce cesarean section rates. But active management is not the only way to lower cesarean section rates. A number of non-invasive, non pharmacological solutions have been shown scientifically to be as effective as active management in lowering cesarean section rates: a companion study (Thornton and Lilford 1994)⁴, midwives continuous support to parturients may be the secret behind low cesarean section rate in this study.

Two prospective randomized controlled trials have been published in the United States, those of Lopezzeno et al⁷ and of Frigotletto et al⁸ both of these studies used the same tenets espoused here, namely, early diagnosis of true labor randomly assigned 351 women to active management of labor and 354 to the control group. Length of labor in the active management group was shortened by 1.7 hours, with a 15% decrease in the cesarean section rate, from 15%,^{5,10} in the active management patients to 14.1% in the control group.

Frigotletto et al⁸ randomly assigned 1017 women to active management and 917 women to usual care in their study. They reproduced all the tenets of the work of O'Driscoll et al., including antenatal education and one-on-one nursing.

Length of labor was significantly shortened by 2.7 hours (6.2 Vs 8.9 hours), and the cesarean section rate was reduced 18% in the active management group compared with controls (9.2% and 11.3%, P- Value not significant), confirming the findings of Lopez-Zeno et al.

The only pieces of the program that survived and stood time testing were routine amniotomy, the liberal use of oxytocin, and the time limit on labor. On the other hand don't under evaluate the continuous support of an experienced woman; this in itself may diminish the cesarean section rate.

Analysis of our results on active labor management showed shorter duration of labor compared with that on traditional management

(3.64 ± 1.84 versus 11.4 ± 5.01 hours P- Value 0.002 it was significant), this pattern corresponds with the North American trials of active management, in which the prolonged labor rates were reduced from 19% to 5% (Lopez et al 1002).⁵

That is to say active management didn't decrease the cesarean section rate and is a good as traditional management with respect to prenatal outcome, it also saves time and effort of the attending physicians.

Our study continues to support previous observations that actively managed labor leads to short labors regardless of the need for augmentation. The benefit of this mode of labor management may be its ability to identify the onset of true labor and to decrease the total length of labor. The onset of labor in nulliparous patients here was based on effacement and regular painful contractions, rather than on Friedman's definition of dilatation and regular painful contractions.⁹ Recent study of early amniotomy, have shown the total duration of labor to be reduced by an

average of only 92 minutes with no reduction in the cesarean section rate after amniotomy performed before late-active phase labor.

Conclusion:

We conclude that, the active management of labor in nulliparous women shortens the duration of labor, increases the likelihood of delivery within 12 hours, and overcomes the delay in delivery.

While there was a trend toward a lower incidence of cesarean section in the actively managed group, this reduction did not reach statistical significance compared with our institutional rate for low-risk nulligravid women. Nevertheless, the degree of reduction achieved may be clinically significant.

A collaboration multi-center trial or further combined individual trials subjected to metaanalysis will be necessary to attain the power needed for a definitive statement and the efficacy of this mode of labor management regarding the lowering the caesarean section rate.

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