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The Correlation Between the Full and New Moons and Onset of Labor

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Capt Andrea R. Neuerburg, USAF, NC
20 May 89
Department of Nursing
Graduate School of Arts and Sciences
Boston College
Research Advisor: Frances Ouellette

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Abstract

This study investigated the relationship between the full moon, new moon, and barometric pressure on the onset of labor. Patients admitted in spontaneous labor to the obstetrical unit of a small U.S. Air Force hospital during 1988 comprised the sample population (N = 281). Dates and times of onset of labor were collected from hospital records. Hourly barometric pressures for each day of 1988 plus, the dates of the full and new moons were also obtained. Frequencies of labor onset at the full and new moon were compared with days controlled for barometric pressure. The frequency of onset of labor at the full moon was also compared with days when the barometric pressure was not controlled. Chi-Square Goodness of Fit was used. Results suggest a significant positive relationship between the onset of labor and significant decreases in barometric pressure ($X^2 = 26.045$, $p < .05$). No relationship was found between the full and new moons and the onset of labor. The findings indicating a relationship between barometric pressure and labor onset support previous inquiries by Driscoll and Merker (1984) and Katzeff (1981). The conflicting nature of the remaining findings, however, makes it difficult to recommend reallocation of resources to coincide with the full and new moons. Additional research conducted with larger sample populations would prove invaluable in assessing the generalizability of these findings.

The Correlation Between the Full and New Moons and Onset of Labor

A study by Stern, Glazer, and Sanduleak (1988) asked the question, Is there a relationship between the full and new moon and the onset of labor and spontaneous rupture of membranes in pregnant women? For their setting the investigators chose "a large tertiary university hospital in Cleveland, Ohio" (Stern et al., 1988, p.59). Their sample included 1999 women, 20 or more weeks gestation, admitted to the labor and delivery unit during 1984, stating that they were in labor or had ruptured membranes. The inpatient records of these women were requested from the hospital record room. The investigators collected the date and time of onset of labor and/or spontaneous rupture of membranes, as well as the patients' age, gravity, and parity. The researchers concluded that "there was a significant positive correlation between the full moon and onset of labor when not controlled for barometric pressure" (Stern et al., 1988, p. 60).

Purpose

The purpose of this investigation is to determine if a significant positive correlation exists between the effects of the full moon, new moon, and barometric pressure and the onset of labor. By replicating the methodology of Stern et al.(1988) with a different sample in a different geographic location, this investigator tested the reliability and validity of their findings. In addition, several of the

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recommendations for further research described in the previous study were implemented. For example, analysis of the data included matching of those days of the full and new moons independent of each other. Unlike the previous inquiry, however, this study did not investigate the lunar effects on spontaneous rupture of the membranes. While certainly an interesting phenomena, researching the lunar effects on ruptured membranes would have complicated the data collection process and inevitably, consumed additional resources.

Significance to the Body of Knowledge and to Nursing

A number of myths exist concerning the effect of the moon on human behavior. Given that "the full moon has been the object of adoration, curiosity, and superstition for all of recorded history", (Stern et al., 1988, p.57) one has to wonder whether some truth does, indeed, lie in these longstanding myths. Lieber and Sherin (1972) acknowledge that it is well known that the moon, through the effects of its gravitational forces on the Earth, is the major regulator of the tides in our great bodies of water. Their study is one of many that studied the correlation between homicide and the full and new moons. Likewise, throughout the ages those who attended childbearing women pondered the effect of the full moon on the onset of labor. However, unlike the case of the full moon and homicide, little research has been conducted to study the effect of the moon on onset of labor.

This investigation benefits nursing in two ways. First, the findings of this study add to the current body of

knowledge on lunar phenomena. In this case, they appear to support those studies in which no correlation was found. Had the data indicated a correlation, the results of this study could have been used to increase the cost-effectiveness and improve delivery of health care. For example, if repeat findings had supported an increase of labor onset during the full and new moons, then nurse managers would have had research to help them plan for increases in the number of admissions to the labor and delivery unit and so, anticipate the increased demand on that unit's resources. This proves crucial during the current nursing shortage when few, if any, nurse managers have "extra" nurses to rely on, especially when the situation calls for nurses with specialized expertise, as is the case with labor and delivery. Furthermore, data suggesting a relationship between the lunar phase and onset of labor might have helped health care professionals better plan the additional tests and procedures accomplished in some labor and delivery settings such as, Oxytocin Challenge Tests, Oxytocin Inductions, and External Cephalic Versions.

Review of the Literature

Lunar and other natural phenomena.

The concept of a lunar influence on human and animal behavior has intrigued mankind for thousands of years. A review of the literature presents three possible explanations for a relationship between lunar phase and human behavioral and physiological response. The first theory maintains that as the gravitational pull increases at the time of the full

moon, it theoretically could create a similar effect on the amniotic fluid (Stern et al., 1988). Another theory claims that barometric pressure changes can have a causal effect on human behavior and labor onset. The third theory, however, concerning the effect of the moon on childbirth focuses on the beginning of the gestational cycle, rather than its culmination. Menaker and Menaker (1959) offered their explanation of increased birth rates at the time of the full moon by proposing that the effect of the moon comes at the time of conception and is due to its influence on cultural behaviors and also its possible effect on the menstrual cycle. According to their hypothesis, if conception is indeed influenced by the full moon, then one can assume that birth would occur around the full moon nine months later.

While barometric pressure alone has been suggested as one of the variables that may influence the onset of labor, a 1981 study by Kaplan showed no correlation. However, to eliminate its strong environmental influence on partuition and spontaneous rupture of membranes, Stern et al. (1988) controlled for barometric pressure as a variable in their study. Their findings suggest that neither the full moon nor drops in the barometric pressure alone leads to an increase in the onset of labor. Rather, their data suggests that it is the combination of the full moon plus, a significant drop in the barometric pressure that accounts for the increase. The investigators explain that "Weather patterns, such as hurricanes, typhoons, and heavy rainfall, are associated with

low barometric pressure readings" (Stern et al., p. 58). One has only to read the newspaper to ascertain the number of babies born during these weather systems. This proves even more significant since the substantial drops in barometric pressure causing these violent weather systems are phenomena frequently occurring during the full moon. Before the Stern et al inquiry (1988), no study had controlled for the effects of barometric pressure during the full moon.

Another area of research investigating lunar effects on man involves crimes of violence, particularly, homicide. In 1972 Lieber and Sherin conducted an investigation to determine if there was a relationship between the lunar cycle and human emotional disturbance. In explaining the rationale for their investigation, they state, "If a lunar effect on homicides does exist, we postulated that it would resemble a tidal periodicity, with the greatest frequency of occurence falling around new and full moon" (Lieber & Sherin, p. 70). They also hypothesized that if gravity was the main determinant of such an effect, then the greatest frequency in homicides would be expected to occur at times of maximum tidal force, i.e. coincidence of new moon and/or full moon with lunar perigee. The data on reported homicides were analyzed by a computer to determine whether a relationship did exist between the lunar synodic cycle and human emotional disturbance. A significant lunar periodicity was demonstrated for homicides committed in Dade County, Florida over the 15-year period studied. The

number of homicides peaked at the full moon and then peaked again, though less substantially, at the new moon.

Astronomical and meteorological facts.

In conducting their research, Stern et al. (1988) considered some basic facts of astronomy and meteorology when designing their study. For instance, today's advanced astronomic data acknowledges that the new moon possesses gravitational effects on the earth equal to those of the full moon. Because of this fact, they studied the effect of both the full and new moons on the onset of labor and spontaneous rupture of membranes, rather than just the full moon as previously done. During the year of their inquiry, 1984, the full and new moons accounted for 75 days. The days on which the new and full moon fell were slightly less evenly distributed than all the days during the year, but these findings were found nonsignificant.

Barometric pressure drops were also taken into consideration. The investigators report that "18.6% of the days of the new and full moon had barometric pressure drops greater than 0.2 inches while 15.6% of all other days during the year had the equivalent drops in pressure" (Stern et al., 1988, p. 59). According to their consulting meteorologist, a fall of 0.2 inches in barometric pressure is considered a significant drop and is generally associated with the advent of inclement weather. As mentioned previously, substantial drops in barometric pressure frequently occur during the full moon. Stern et al. (1988) report that the lunar influence

over heavy rainfall was supported in a 50 year survey conducted by scientists from New York University and the U.S. Weather Bureau.

Theories of labor.

At present, the medical and nursing literature indicate four possible causes for the onset of human labor. The first of these is the progesterone theory. According to one of its proponents, Dr. Firyal Khan-Dawood (1987), the decreased progesterone levels in the chorion at term, together with enhanced placental and chorionic production of progesterone from its precursor, pregnenolone, suggest that rapid metabolism and increased binding of progesterone locally in the placenta and membranes may lead to the local withdrawal or decline of progesterone and the onset of labor. The Khan-Dawood study was one of the first to investigate the conversion of pregnenolone to progesterone in humans. Previously, although a decline in circulating progesterone had been found in some species at the approach of labor onset, such a clear change had yet to be convincingly demonstrated in human labor.

Another theory which has gained considerable support during the last decade is the prostaglandin theory of labor. Research has primarily focused on the role of prostaglandin E2 in the onset of labor but, lately some investigators have looked at the possible contributions of other prostaglandins, for example F2 and D2. Berryman, Strickland, Hankins, and Mitchell (1987) have conducted the first published research on

the effects of prostaglandin D2 in human labor. In their study prostaglandin D2 (PGD2) was quantified in amniotic fluid obtained from women in various phases of the first stage of spontaneous labor, augmented labor, and induced labor. They discovered that PGD2 increased significantly only in late labor in the spontaneous and augmented labor groups, suggesting that PGD2 may play a greater role in the transitional phase of labor as opposed to its onset.

Influence of the full and new moon on onset of labor and spontaneous rupture of the membranes.

The most recent inquiry into the possible connection between the moon and labor was undertaken by Stern, Glazer, and Sanduleak (1988). After collecting data for a full calendar year, their "results show a positive significant correlation of onset of labor to the full moon when barometric pressure is not controlled" (Stern et al., p.57). However, the frequencies of onset of labor and spontaneous rupture of membranes show positive, but nonsignificant correlation when barometric pressure is controlled. Therefore, they believe there is a compounding, if not primary, influence by barometric pressure to that of the full or new moon. Their data lends support to two of the lunar theories previously mentioned, the biologic tide theory and the barometric pressure theory.

Formal investigations concerning the full moon and childbirth began as late at the 1900's. The 1959 Menaker and Menaker study, the first major study to look at both the new

and full moon, showed the fewest number of births associated with the new moon and the greatest number with the full moon. Stern et al. (1988) explain that more recent studies improve upon earlier ones by including comparisons of birth rates and homicides to both the full and new moon. However, these studies that examine homicides and suicides in relation to the full and new moons differ in their findings as does research that studies numbers of births. The lack of consistency among these studies supports the need for replication of previous research done in this area.

Theoretical nursing framework

Although Stern (1986) did not apply a theoretical nursing framework to her inquiry, her research did lend itself to application of one. In considering the various nursing theories, probably no framework fits both her investigation and this one as well as Martha Rogers' Science of Unitary Man. According to Rogers, "Man whom nursing strives to serve, is a unified whole, a synergistic system, who cannot be explained by knowledge of his parts" (1970, p. vii). She conceptualizes man and the environment as continuously exchanging matter and energy with one another. This relationship of constant mutual interaction and mutual change is called the principle of reciprocity. The constant interaction between the pregnant woman and the full moon in both inquiries exemplifies Rogers' principle of reciprocity. Hypotheses

Four hypotheses were tested:

1. The onset of labor occurs more frequently during the full moon than at any other time during the lunar month.
2. The onset of labor occurs more frequently during a 24 hour interval in which the barometric pressure has dropped 0.2 inches or more, than it occurs at times when the barometric pressure has not dropped at least 0.2 inches.
3. The onset of labor occurs more frequently during the time in the lunar month when the moon is full and there has been a barometric pressure drop of 0.2 inches or more.
4. The onset of labor occurs as frequently during the new moon as it does during the full moon.

Variables

Four variables were considered during this investigation, three independent and one dependent. The first two independent variables consist of the full moon and the new moon while, the onset of labor represents the dependent variable. Because of the data indicating the presence of significant drops in barometric pressure during the full moon, its potential influence cannot be overlooked. Therefore, barometric pressure comprised the third independent variable.

Operational definitions

The full moon occurs on lunar day 15 when half the moon receives reflected light from the sun. The time period includes the 24 hours before the day of the full moon and the 24 hours after.

The new moon occurs on lunar day one when none of the moon receives any reflected light from the sun. The time

period includes the 24 hours before the day of the new moon and the 24 hours after.

The onset of labor occurs when uterine contractions of sufficient frequency, intensity, and duration to bring about a readily demonstrable change in the effacement and dilation of the cervix are attained, resulting in the admission of the woman into the labor and delivery unit. To eliminate potential conflicts regarding the actual time of onset, the researcher used the date and time noted on the labor record (United States Government Printing Office Standard Form 534).

Barometric pressure is defined as the force per unit area exerted by an atmospheric column, measured in inches of mercury.

Methods

Research design

A correlational retrospective design was employed in this inquiry. This design was chosen because none of the independent variables lent themselves to manipulation

Sample

A convenience sample of women, 35 or more weeks gestation, admitted in labor to the obstetrics unit of a small U.S. Air Force (USAF) hospital was selected for study. Within this level I facility, the principle investigator used the Delivery Log available on the unit to select subjects who met criteria for inclusion in the study. Patients admitted from 1 January 88 through 31 December 88 were considered in order to allow for normal monthly and seasonal fluctuations in births.

Premature deliveries were considered, as well as any Cesarean deliveries following spontaneous onset of labor. The sample also included patients whose labors required Oxytocin augmentation. However, those women whose labors resulted purely from Oxytocin induction were not incorporated into the current study as an induced labor cannot be considered to have a spontaneous onset. Likewise, those women who chose to deliver by an elective C-Section without a trial of labor were also eliminated from the sample. After reviewing the Delivery Log, 98 (21%) of the 458 women who delivered during 1988 were automatically deleted from the sample for failure to meet the above criteria, leaving a maximum sample size of 360 women. Ages ranged from 16 - 36 years.

Instruments

This investigation made use of one data collection tool in the form of a coding sheet. Using this tool, the investigator could list the date and time of admission, age, gravidity and parity, expected date of confinement, date and time of onset of labor, date and time of delivery (vaginal or cesarean), and gestational age (See Appendix A). This tool was modified from the original used in Stern's research (1986).

To code the collected data for computer input, the investigator modified the data collection tool, by deleting the columns for delivery time and type and adding columns for lunar phase and barometric pressure trends (See Appendix B). Alpha numeric data, such as, the admission date, estimated

date of confinement, date of onset of labor, and delivery date, were converted to numeric data. As military health care facilities use the 24-hour clock to tell time, this eliminated one step in the coding procedure. However, since Air Force weather units use Greenwich Mean Time to record meteorologic data, this investigator converted all times coming from the medical record from Eastern Time to Greenwich Mean Time.

Procedure for data collection

Data pertaining to the study was compiled from information documented on hospital records used by the facility. The data includes maternal age, gravidity and parity, the date and time of admission, and other data as listed in the above-mentioned tool. The gestational age was determined with the aid of a Parlodel gestation calculator, using the estimated date of confinement listed on the labor and delivery record (Standard Form 534) and the date of onset of labor. If the estimated date of confinement was not listed there, it was obtained from the prenatal record (Standard Form 533).

The principle investigator obtained permission from the Clinical Records Librarian to access the charts of the 360 women thought to meet sample criteria. Of these 360, eight (2%) were unavailable for review. Another 71 (20%) records were deleted upon closer inspection, leaving a total sample size of N = 281. Reasons for elimation included elective Cesarean sections or Oxytocin inductions that were not annotated in the unit's Delivery Log. However, the most

frequent reason for excluding a patient's chart was the inability to discern from the labor record whether some patients admitted with ruptured membranes had premature rupture of the membranes (PROM) or spontaneous rupture of the membranes (SROM). Of the 71 records deleted, 32 (45%) were eliminated for this reason. In each case, the principle investigator checked the Nursing Admission Assessment to determine whether the patient was having regular uterine contractions on admission but, the documentation on these forms was incomplete as well.

Barometric pressure readings and dates of the full and new moons for 1988 were requested from the local Air Force weather detachment, yielding two different products. The first was a computerized listing of the moonrise, moonset, and percent illumination for each day of 1988. By looking at the daily percentage of illumination and applying the aforementioned operational definitions, this investigator was able to ascertain the dates of both the full and new moons for each month. Besides the computerized listing, the staff provided the researcher with photostatic copies of completed Air Force Forms 10 for each day of 1988. The weather staff uses this form to record hourly station pressures (barometric pressures corrected for feet above sea level for an area).

In an attempt to decrease some of the sources of measurement error, the principle investigator collected most of her data during the morning hours, when she was most alert. In addition, the investigator alternated reviewing charts with

pulling patients' records from the files. This prevented boredom when screening records. Also, in order to avoid problems with interrater reliability, the principle investigator accomplished all the data collection herself. Most importantly, however, she controlled for bias when collecting the data pertaining to onset of labor by postponing the examination of the meteorologic data until after she had finished reviewing all of the available charts.

Method of data analysis

The frequency of onset of labor at the full and new moon was compared with days controlled for barometric pressure. A three-day span, incorporating the 24 hours both before and after each full and new moon, was used in analyzing the data. In addition, the frequency of onset of labor at the full moon was also compared with days when the barometric pressure was not controlled. The Statview 512+ computer program was used to calculate a Chi-Square Goodness of Fit for the following relationships:

1. The occurrence of labor onset during the full moon and the occurrence of labor onset at other times during the lunar month.

2. The occurrence of onset of labor during 24-hour intervals in which the barometric pressure has dropped at least 0.2 inches and the occurrence of labor onset when the barometric pressure has not dropped 0.2 inches or more.

3. The occurrence of onset of labor during the full moon and the occurrence of labor onset during the new moon.

A contingency table was then hand-tabulated to obtain a One-Group Chi-Square for the following relationship.

4. The occurrence of onset of labor during full moons accompanied by barometric pressure drops of 0.2 inches or more and the occurrence of labor onset during full moons not accompanied by equivalent decreases in the barometric pressure.

Human use protocols

The principle investigator obtained institutional approval from the Chief of Nursing Services, former Hospital Administrator, and Chief of Resource Management prior to conducting research. Due to the retrospective design of this inquiry, contact with human subjects was not necessary. The data collection tool did not contain either the patient's name or hospital number so that the patient's confidentiality was protected. A master list with the patients' hospital number and the corresponding subject number was kept in a locked file, but only the subject number appeared on the tool. No identifying data such as, Social Security number, address, or telephone number was collected at any time during this investigation. At no time were the patient's rights, as defined by the Privacy Act of 1974, abused by this investigator.

Results

Findings

Frequency distributions were calculated to count the number of labors established during the full moon and new

moon, as compared to any other time during the lunar cycle (See Table 1, Appendix C). According to the null hypothesis, if each lunar cycle lasts 29.5 days, and the full moon is operationalized to account for three of those days, then 10% of all spontaneous labors would begin during the full moon. The same assumption would hold true for the new moon, while the remaining 80% of the labors would be distributed throughout the rest of the month. In the sample population, 9.609% of the patients started labor during the full moon and, another 11.032% went into labor during the new moon. Figure 1 (Appendix D) illustrates this frequency distribution graphically.

Additional frequency distributions were calculated for labors commencing during significant drops in the barometric pressure and for labors established during full moons accompanied by a significant decrease in the barometric pressure. Of the 281 subjects in this inquiry, 33 (11.74%) started labor during significant barometric pressure drops (See Table 2, Appendix E and Figure 2, Appendix F). The null hypothesis would imply that 25% of all spontaneous labors would originate during a significant drop in the barometric pressure, with another 25% of the labors starting during a rise in the pressure. The onset of the remaining 50% of the labors would be equally divided between days of stable barometric pressure and days characterized by a non-significant drop in the pressure. When examining the frequency of labor onset during full moon accompanied by

significant drops in the barometric pressure, however, the principle investigator found only two (0.71%) patients in the sample who fell into this category.

As mentioned in the previous section, the Chi-Square Goodness of Fit was used to measure the relationship between each of the independent variables and the onset of spontaneous labor. Four hypotheses were tested:

1. The onset of labor occurs more frequently during the full moon than at any other time during the lunar month.

No relationship was found between the full moon and the onset of labor, (X^2 = .053, p > .05). Hypothesis 1 was not supported.

2. The onset of labor occurs more frequently during a 24-hour interval in which the barometric pressure has dropped 0.2 inches or more, than it occurs at times when the barometric pressure has not dropped at least 0.2 inches.

A relationship was found between barometric pressure and the onset of labor, (X^2 = 26.045, p < .05). Therefore, hypothesis 2 was supported.

3. The onset of labor occurs more frequently during the time in the lunar month when the moon is full, and there has been a barometric pressure drop of 0.2 inches or more.

No correlation was found between the onset of labor and the full moon during significant decreases in barometric pressure (X^2 = 4.333333, p > .05). As a result, hypothesis 3 was not supported.

4. The onset of labor occurs as frequently during the new moon as it does during the full moon.

No significant correlation was found between the frequency of labor onset during the full moon and the onset of labor during the new moon, (X^2 = .3571, p > .05). Hypothesis 4, also, was not supported. These findings are summarized in Table 3 (Appendix G).

Analysis of results

The findings of this inquiry do not support a relationship between the full moon and labor onset (Hypothesis 1), the full moon and the new moon (Hypothesis 3), or the onset of spontaneous labor during full moons accompanied by a significant drop in the barometric pressure (Hypothesis 4). In each of these cases then, the investigator failed to reject the null hypothesis. However, the results do suggest a correlation between significant falls in barometric pressure and the spontaneous onset of labor. Hypothesis 2 was supported.

Discussion and Recommendations

Relationship to prior research findings

The findings of this inquiry fail to support a correlation between the full moon and an increased onset of spontaneous labor when barometric pressure is controlled. Although Stern (1986) examined the relationship between lunar phase and onset of labor, she did not consider the full and new moons independently when barometric pressure was controlled. Instead, she recoded the data into one variable

and examined the frequency of labor onset in this manner, makeing it difficult to apply the findings of this particular investigation in which the full moon and new moon were considered individually. Before Stern's (1986) research, all previous studies in this area measured the correlation between lunar phase and number of deliveries occurring, rather than number of labors established.

According to Stern (1986), ". . .gravitational pull on the earth is relatively equal during the new moon and the full moon" (p. 50). If this, then, is true, like frequencies of onset of labor should be expected during the full moon and the new moon. In her study, Stern (1986) did not obtain these findings. However, in the present inquiry, the principle investigator did find similar frequencies during the full and new moons (See Table 1, Appendix C). Although these frequencies were similar, they were not statistically significant.

Stern et al. (1988) cite previous studies (Driscoll & Merker, 1984; Katzeff, 1981; Nalepka, et al., 1983), implicating low barometric pressure or the significant falling of barometric pressure as having an influence on the onset of labor. Another investigation by Kaplan (1981) found no correlation between barometric pressure and the onset of labor. In her research, Stern (1986) did not consider barometric pressure as an independent variable, rather she controlled for it as an extraneous variable. In the present study, however, significant decreases in barometric pressure

was one of the independent variables, and a significant positive correlation was found between these significant drops and the onset of spontaneous labor. These results, therefore, support the implications put forth by Driscoll & Merker (1984) and Katzeff (1981).

Lastly, the results of this inquiry do not support Stern's (1986) findings regarding the full moon and labor onset in the presence of significant barometric pressure drops. The findings of her study support a significant positive correlation when a comparison of frequencies for the full moon are given with no control for barometric pressure. In contrast, the results of this investigation did not indicate a significant relationship between the full moon and spontaneous labor onset when there has been a significant barometric pressure drop.

Implications for nursing practice

Although the research findings indicate a positive correlation between significant barometric pressure drops and the onset of labor, the conflicting nature of the remaining findings makes it difficult to recommend reallocation of resources to coincide with the full and new moon. While one can find out the dates of each full and new moon for an entire year, barometric pressure changes are not as predictable. The only method of predicting barometric pressure drops is by observation of low pressure weather fronts and estimating their arrival. Since meteorologists can only estimate the arrival of these fronts 72 hours in advance, this does not

help the nurse manager in making any long-range staffing plans. However, he/she may want to implement an on-call schedule to provide additional coverage when inclement weather is forecasted.

Limitations of the study

The principle researcher has identified a number of factors which limit the generalizability of the findings. First of all, time constraints impacted the ability to obtain a sample size comparable to those in previous studies. Including the one in Stern's (1986) inquiry, these samples ranged from 2,000 to 50,000 in size. In comparison, then, the sample procured for this investigation (N = 281) appears paltry indeed. Because the degree of sampling error increases as the sample size decreases, it is possible that these research findings display a higher degree of error than those of previous studies.

In addition to the above limitations, onset of labor is subjective information. The accuracy of the annotated time of labor onset on the labor record (Standard Form 534) depends on two factors, the reliability of the patient as an historian and the expertise of the nurse in accomplishing a nursing assessment on a laboring patient. Frequently, this time is altered by nursing personnel at their discretion as to when they think labor began. In collecting the data, this investigator discovered 40 charts (14% of N = 281) in which the documented time of onset was either the same as, or later than, the time of admission. As the researcher had already

deleted the records of all the patients admitted for Oxytocin inductions, plus those with questionable premature rupture of membranes (PROM), there was no logical reason why these patients would have presented to labor and delivery, unless they were in labor. Therefore, the time of labor onset documented on the Standard Form 534 should have preceded the time of admission for each of the 281 women remaining in the sample.

Recommendations for future research

Based on the difficulties encountered during this research study, future studies of this nature should not be undertaken with a sample of less than 1,000 potential subjects. Starting with a larger initial sample should produce a larger final sample after all the elective Cesarean section and Pitocin induction patients have been deleted from the study. Also, it will reduce the degree of sampling error. If the facility chosen for the inquiry does not average 1,000 deliveries per year, then this investigator recommends a two-year project. Besides providing a larger sample, a two-year study might produce more consistent data.

Furthermore, this researcher highly recommends that future investigators assess the degree of obstetrical expertise and the stability of the nursing personnel in the labor and delivery area, prior to seeking institutional approval. If the proposed research site does not have an experienced, stable nursing staff, then the principle investigator may want to consider doing a prospective study,

instead of using a retrospective design. This would eliminate some of the confusion regarding onset of labor. Depending upon time constraints, the researcher could either include only those patients whom he/she personally interviewed on admission, or engage the help of one or two research assistants. In the latter case, the principle researcher would have to ensure that each of his/her assistants defines the onset of labor the same way.

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APPENDIX A

SUBJ NO	ADM DATE	ADM TIME	EDC	AGE	GRAVIDA	PARA	DATE ONSET OF LABOR	TIME ONSET OF LABOR	DELIVERY DATE	DELIVERY TIME	DEL TYPE	PIT AUG	PT CLASS	GEST AGE

APPENDIX B

SUBJ NO (3sp)	ADM DATE (3sp)	ADM TIME (GMT) 4sp	EDC 4 sp	AGE 2 sp	GRAVIDA (1 space)	PARA (1sp)	DATE ONSET OF LABOR (3 sp)	TIME ONSET OF LABOR (4 sp)	DELIVERY DATE (4 space)	PITOCIN AUGMENT 1 = No 2 = Yes	PT CLASS 1 = Lo 2 = Hi-	GEST AGE 20.0 42.5	LUNAR PHASE 1=Full 2=New 3=0th	BARO PRESS 1=Ri 2=St

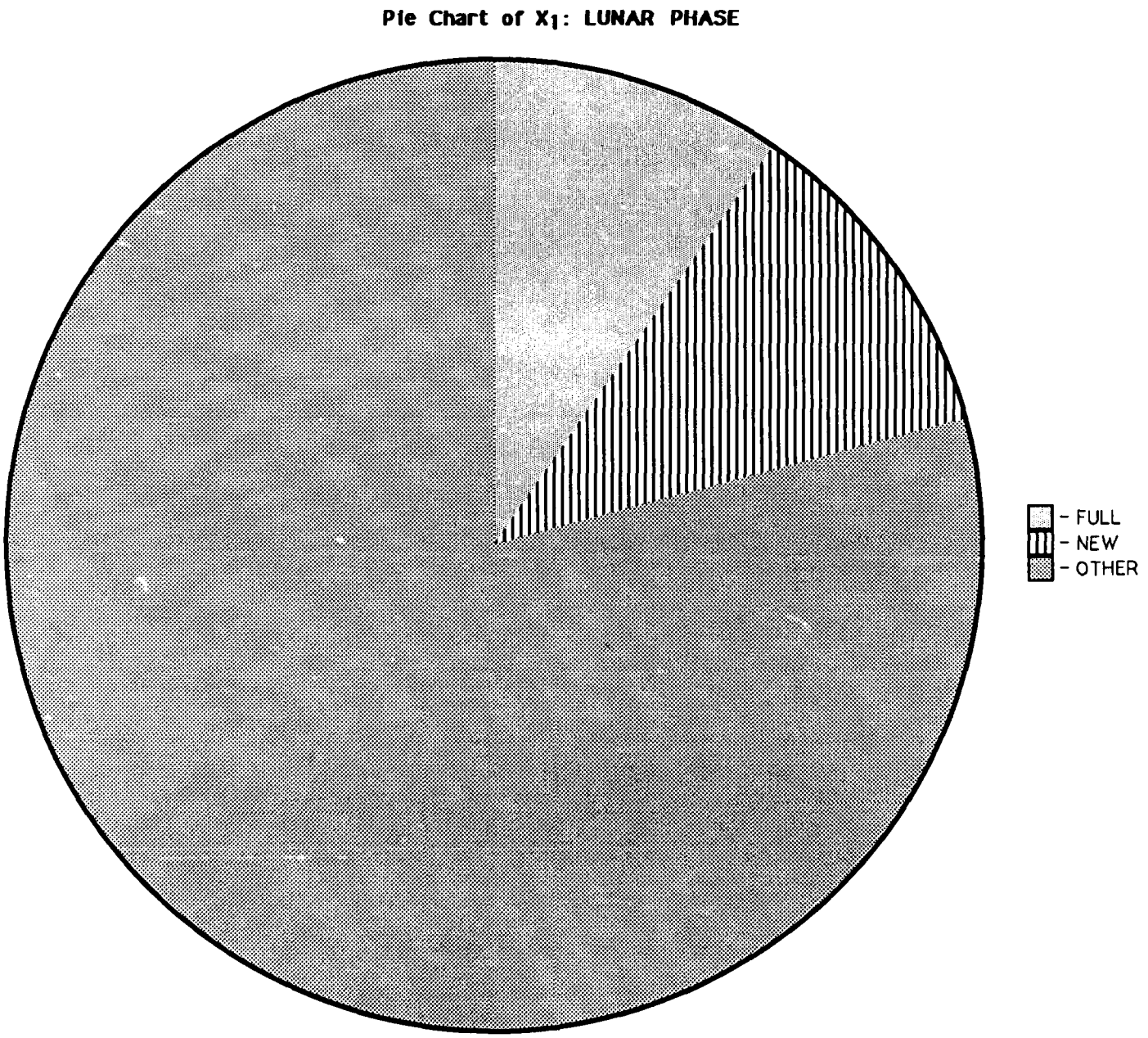
Appendix C: Table 1

X_1: LUNAR PHASE

Bar:	Element:	Count:	Percent:	
1	FULL	27	9.609	
2	NEW	31	11.032	
3	OTHER	223	79.359	-Mode

Frequency Distribution of Onset of Labor by Lunar Phase

Appendix D: Figure 1



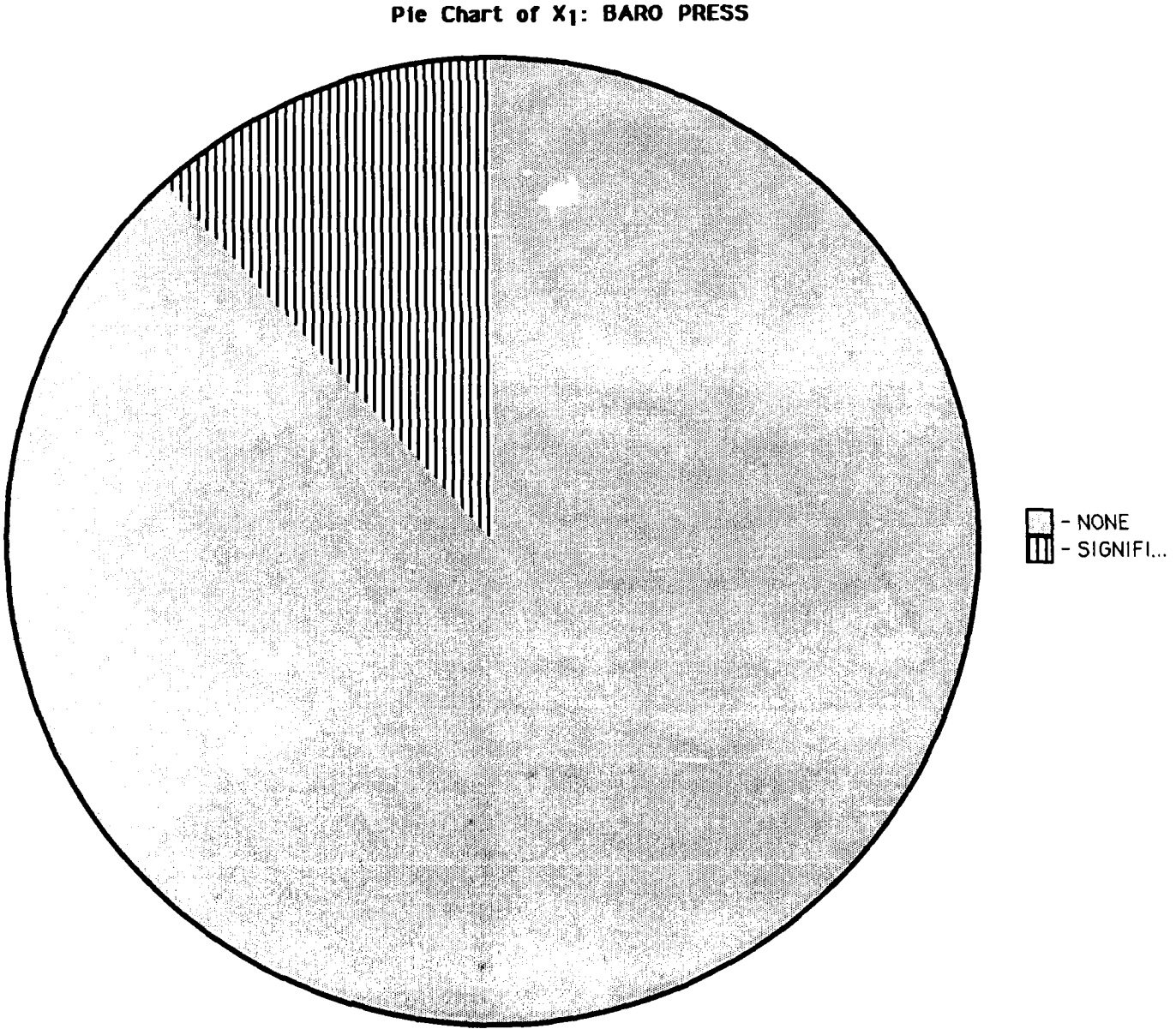
Frequency Distribution of Onset of Labor by Lunar Phase

X_1: BARO PRESS

Bar:	Element:	Count:	Percent:	
1	NONE	248	88.256	-Mode
2	SIGNIFICANT	33	11.744	

Frequency of Onset of Labor During Significant Drops in Barometric Pressure

Appendix F: Figure 2



Frequency of Onset of Labor During Significant Drops in Barometric Pressure

Appendix G

Table 3

Correlation Between the Full Moon, New Moon, Barometric Pressure and the Onset of Spontaneous Labor

Independent Variable	X^2	df	p
Full moon	.053	1	.8171
New moon	.357	1	.5501
Significant decreases in barometric pressure	*26.045	1	.0001
Full moon during significant drops in barometric pressure	4.333333	2	> .05

* Significant at $p < .05$