

Relationship between Quality of Sleep and Pregnancy Outcomes among Primipara

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Abstract: Sleep disturbances are distinctly more common in pregnant women. Sleep in the pregnant women progressively worsened for example, the risk of insomnia is estimated to be 2.03 times higher in later compared to earlier pregnancy as measured by the insomnia severity index. **Aim of the study** to identify the relationship between quality of sleep and pregnancy outcomes among primipara. **Material:** Research design: A descriptive research design was utilized in this study. **Setting:** The study was conducted at the labor unit of El-Shatby Maternity University hospital in Alexandria. **Subjects:** A Convenience sample of 300 pregnant women attending the previously mentioned setting was included in the study **Tools:** Three tools were used to collect the necessary data. **Tool (I):** pregnant woman Basic data interview schedule was included two main parts: first part: socio demographic characteristics (age, education, marital status, occupation, income, residence, age at marriage), second part: women's profile of current pregnancy (whether it was planned or not, weeks of gestation, number of antenatal visit, accompanying pregnancy of symptoms). **Tool (II):** Pittsburgh Sleep Quality Index (PSQI) and **Tool (III):** Maternal & Fetal Outcome Observational Checklist. **Results:** about two thirds (67.7%) of study subjects reported no difficulty during sleep. As much as 31.3% of them had mild difficulty compared to only 1.3% who had severe sleep difficulty. **Conclusion:** It was concluded that a significant association between sleep difficulties some of socio-demographic, maternal and newborn related factors was evident. Such as low level of education, maternal distress, fetal distress, low APAGR as well as neonatal measurements. **Recommendation(s):** it was recommended that sleep quality during pregnancy and its associated factors are suggested to be included in maternity curricula at the related educational settings.

Keywords: Sleep quality, pregnancy, maternal outcome, fetal outcome.

1. INTRODUCTION

Pregnancy is special event in women's lives and indeed in the lives of their families. It is a unique experience as well as a time of great hope and joyful anticipation. Pregnancy also highlights women's amazing creative and nurturing powers and provides a bridge to the future ⁽¹⁾. Many expectant mothers report complaints of sleep disturbance during pregnancy. Sleep is an active state vital for physical, mental and emotional well-being as well as cognitive functioning of the person. It is a natural periodic state of rest for the mind and body in which the eyes usually close and consciousness is completely or partially lost, so that there is decrease in bodily movement and responsiveness to external stimuli. Sleep disturbances are distinctly more common in pregnant women. It is progressively worsened for example, the risk of insomnia is estimated to be 2.03 times higher in later pregnancy compared to earlier as measured by the insomnia severity index ^(2,3). **Facco et al** (2010) ⁽⁴⁾ also found that sleep duration significantly decreased during pregnancy and increase of poor sleep quality. According to a recent US survey involving 2427 pregnant women, 76% reported poor sleep quality, 78% took daytime naps, 38% had insufficient nighttime sleep (6 h), and 49% experienced significant daytime sleepiness, with 100% reporting frequent nighttime awakenings. Sleep disturbances have also been reported in a European sample of pregnant women, with up to 75% of them complaining of poor sleep, decreased vigilance, and requiring a nap during the day ^(5,6).

During pregnancy, a women's body undergoes significant changes to support the needs of the developing fetus, prepare for childbirth, lactation, ensure a healthy fetal environment and support the maternal physiologic needs. These changes especially hormonal changes may result in substantial sleep disturbances. Estrogen reduces rapid eye movement sleep (REM) and can also cause physical changes that affect sleep pattern, including hyperemia, mucosal edema, and increased friability in the upper airways as well as reduction of nasopharyngeal airway patency, which can cause a sensation of nasal stuffiness and may exacerbate sleep disordered breathing in pregnant women ⁽⁷⁾.

While progesterone is thought to act via peripheral chemoreceptors and centrally in the medulla to increase respiratory drive. This, in conjunction with greater metabolic carbon dioxide production and increased minute ventilation, can cause respiratory alkalosis and predispose to central sleep apnea. Furthermore, oxygen consumption is increased by approximately 20% to 33% by the third trimester due to fetal demands and changes in maternal metabolism. Increased oxygen consumption, along with a reduced functional residual capacity due to an enlarging uterus, results in a lowered oxygen reserve and can affect oxygen homeostasis ⁽⁸⁾.

Moreover dramatic physical changes unique to pregnancy can further affect sleep. The enlarging uterus can upwardly displace the diaphragm, further compromising functional residual capacity, which decreases by 10% to 25% at term. This, together with reduction in chest wall and total respiratory compliance, may lead many pregnant women to experience shortness of breath while lying supine. The inability to assume a comfortable sleeping position, especially during the third trimester of pregnancy, may have a significant impact on a pregnant woman's ability to initiate and maintain sleep. Discomfort from back and leg cramps and gastroesophageal reflux can cause discomfort and sleep disruptions. Additionally, renal blood flow increases in pregnancy throughout first and second trimester, along with dilation of the ureters and renal pelvises. These changes and the pressure of an enlarged uterus on the bladder cause pregnant women to wake several times per night to urinate ⁽⁹⁻¹²⁾.

Sleep deprivation is a state that includes inadequate quantity or quality of sleep, voluntary or involuntary insomnia (sleeplessness) and circadian rhythm sleep disorders. Large body of literature comprising epidemiological studies suggests that sleep disturbances among pregnant women is associated with adverse maternal outcomes such as preeclampsia, longer labour times, higher cesarean section rates and preterm birth. Disturbed sleep is also linked with an increase inflammatory response that is key biological pathway through which chronic disease and adverse pregnancy outcomes develops preeclampsia, increased insulin resistance via increased inflammation, unfortunately poor sleep quality during pregnancy are also associated with an increased risk of adverse neonatal outcomes such as low birth weight, intrauterine growth retardation and low APGAR scores. Various factors could influence day-to-day sleep outcome ⁽¹³⁻¹⁶⁾.

There is little known about the relation of quantity and quality of normal sleep during pregnancy and labor out-comes; both maternal and fetal. Therefore, studies are needed to obtain knowledge about sleep deprivation during pregnancy to identify the pregnant women's clinical, social, and behavioral risk factor related to poor sleep. It helps physicians and maternity nurses enhance women's health, as well as facilitating appropriate interventions to prevent negative labor outcomes. Consequently, the present study aims to identify the relationship between quality of sleep and pregnancy outcomes among primipara. This will ultimately serve as potential clinical targets for intervention to improve sleep quality in pregnant women.

Aim of the study:

To identify the relationship between quality of sleep and pregnancy outcomes among primipara

Research question:

Is there relationship between quality of sleep and pregnancy outcomes among primipara?

2. MATERIALS AND METHOD

MATERIALS:

Research design: A descriptive research design was utilized in this study.

Setting: The study was conducted at the labor unit of El-Shatby Maternity University hospital in Alexandria. This setting was selected because it has an increased turnover of labor and women who represent different socioeconomic levels.

Subjects: The subjects were a convenience sample of 300 pregnant women. The inclusion criteria were: Primiparae women, in spontaneous labor, free from any medical & obstetrical diseases and willingness to participate in the study. Sample size was determined by Epi-info 7 software program)

Tools: Three tools were used to collect the necessary data.

Tool (I): Pregnant Woman Basic Data Interview Schedule:

This tool was developed by the researchers. It was included two main parts: **first part:** socio demographic characteristics (age, education, marital status, occupation, income, residence, age at marriage), **second part:** women's profile of current pregnancy (whether it was planned or not, weeks of gestation, number of antenatal visit, accompanying pregnancy of symptoms).

Tool (II): Pittsburgh Sleep Quality Index (PSQI) :

This tool was originally developed by Buysse et al (1989)⁽¹⁷⁾ to measure the quality and patterns of sleep during past month. This index was modified by the researchers to suit the Egyptian culture. It entails 19 items divided into 7 dimensions. Specifically: subjective sleep quality (SSQ) (2items), sleep latency (1items), sleep duration (1 item), habitual sleep efficiency (SE) (2items), sleep disturbance (10 items), use of sleeping medication (1 item) and daytime dysfunction (2 items). Subjects' response to each item varied among a 3 point Likert scale. Namely: none (zero), once or twice a week (1), and three or more times a week (2). The subject responses in 3rd and 4th domains were reversed. Subject's total score ranged between 0-21. Each Subject's sleep pattern & quality level ranked as follows:

- No difficulty (<11).
- Mild difficulty (11-17).
- Severe difficulty (>17).

Tool (III): Maternal & Fetal Outcome Observational Checklist: this tool was developed by the researchers it was included two main parts:

Part (1): Maternal pregnancy outcome assessment checklists: It was involved onset of labor (spontaneous or induced), maternal distress (presence or absence of distress), mode of rupture of membranes (spontaneous or artificial), time of rupture of membranes (premature or mature), type of delivery (normal or cesarean section), duration of the three stages of labor (short, normal or long), presence or absence of labor complications (genital injuries, uterine inertia, obstructed or prolonged labor, cord prolapse, bleeding, and retained placenta etc.), whether medication is received or not during labor (oxytocics as well as local, spinal or general anesthesia).

Part (2): Fetal pregnancy outcome assessment checklists: it was included Fetal condition (presence or absence of distress), fetal status (alive, stillborn or dead), Apgar score at one and five minutes, Presence or absence of caput succedaneum and meconium aspiration, Presence or absence of intra-uterine growth restriction as well as visible congenital anomalies and their types as diagnosed by the pediatrician, Newborn's measurements (birth weight and height as well as head and chest circumferences).

METHOD:

The study was executed according to the following steps:

1. An official letter from the Faculty of Nursing-University of Alexandria was directed to the responsible authorities of El Shatby Maternity Hospital to obtain permission to conduct the study and collect the necessary data.
2. Tools I &III were developed by the researchers based on recent, current and relevant literature. While tool II was adapted and modified by the researchers to suit the Egypt culture.
3. Tools were tested for content validity by a jury of five experts in the field of obstetric and gynecologic nursing. The recommended modifications were done and the final form was finalized after proving valid.
4. Tools reliability was tested by Cronbach's alpha test. The result was (0.793) which indicated an acceptable reliability for the tool.

5. A pilot study was carried out on 30 pregnant women (excluded from the study subjects) from the previously mentioned settings.
6. Each parturient was individually interviewed using the study tools I & II to measure the quality and patterns of sleep in during pregnancy. The duration of each interview ranged between 30-45 minutes.
7. Then they observed during each stage of labor for outcome through using the study tool III to assess onset of labor (spontaneous or induced), presence or absence of maternal distress), mode of rupture of membranes (spontaneous or artificial), type of delivery (normal or cesarean section), duration of the three stages of labor (short, normal or long), presence or absence of labor complications (genital injuries, uterine inertia, obstructed or prolonged labor, cord prolapse, bleeding, and retained placenta etc.), Whether medication is received or not during labor (Oxytocic as well as local, spinal or general anesthesia).
8. Then after a newborn's assessment sheet was employed to identify the neonate's outcomes. It assess for presence or absence of fetal distress), fetal status (alive, stillborn or dead), Apgar score at one and five minutes, presence or absence of caput succedaneum and meconium aspiration, presence or absence of intra-uterine growth restriction as well as visible congenital anomalies. In addition to anthropometric measurements of the newborn were recorded, including weight , head & chest circumferences and length
9. Data were collected from women four days per week (from 8:30 am to 3 pm) were specified for data collection over a period of six months, started from the beginning of January till the end of June 2016. An average of 2to 3 interviews was performed per day.
10. The collected data was revised, categorized, coded, computerized, tabulated and analyzed using Statistical Package for Social Sciences (SPSS) The version 20. The following statistical measures were used:
 - A) **Descriptive statistics:** included frequency, percent and mean with standard deviation to describe the scale and categorical data.
 - B) **Analysis of categorical data:**
 - Fisher's exact probability was calculated using Mont Carlo method and ^{FET}P were used to explore relationships between variables.
 - P value ≤ 0.05 was considered statistically significant.

3. RESULTS

Table (I): shows the socio-demographic characteristics of study subjects. Approximately an equal percent (42% & 46.3%) of study subjects were either in their teenage or twenties, respectively. only 11.7% of them were in their thirties. More than one half (58%) of them were holding secondary certificate compared to only 26.6% who were university graduates. Slightly more than two-thirds (67.3%) of them were housewives compared to 25% who were employees & few of them 7.7% were workers. Almost all of them (98.7%) were married. Considerable percent (58.0 % & 61.0%) of them were dwelling urban areas within nuclear families, respectively. The majority (92.0%) of them perceived their families' income as adequate.

Table (I): Number and percent distribution of the study subjects according to their socio-demographic characteristics

| Socio-demographic characteristics | No = (300) | (%) |
|-----------------------------------|-----------------------|------|
| Age | | |
| • < 20 | 126 | 42.0 |
| • 20 - < 30 | 139 | 46.3 |
| • ≥30 | 35 | 11.7 |
| | Mean ± SD = 22.1±3.25 | |
| Level of education | | |
| • Illiterate | 8 | 2.7 |
| • Primary level | 38 | 12.7 |
| • Secondary level | 174 | 58.0 |

| | | |
|------------------------------|-----|------|
| • University or higher level | 80 | 26.6 |
| Occupation | | |
| • Housewives | 202 | 67.3 |
| • Worker | 23 | 7.7 |
| • Employer | 75 | 25.0 |
| Marital status | | |
| • Married | 296 | 98.7 |
| • Divorced | 4 | 1.3 |
| Residence | | |
| • Urban | 174 | 58.0 |
| • Rural | 126 | 42.0 |
| Family type | | |
| • Nuclear | 183 | 61.0 |
| • Extended | 117 | 39.0 |
| Perceived income | | |
| • Adequate | 276 | 92.0 |
| • Not adequate | 24 | 8.0 |

Table (II) portrays number and percent distribution of study subjects according to each domain of sleep quality during past month. It was observed that slightly more than one-half (52.0%) of them perceived their sleep quality as fair, while more than one fifth (24.0%) of them reported very good quality of sleep. The majority (87.7%) of them mentioned sleep disturbance twice per weeks compared to only 12.0 % who had sleep disturbance once per week. Turning to using of sleep medications it was noted that as much as 77.3% of study subjects did not used sleep medications compared to only 21.7% of them who took sleep medications for once time a week. About two-thirds (61.3%) of them mentioned daytime dysfunction twice per week due to sleep disturbances compared to more than one-third (36.0%) of them had daytime dysfunction for three or more per week. Approximately equal percent (42.7% &45.7%) of them took either 31- 60 or 16- 30 minutes to fall into sleep, respectively. More than three-fifths (64.0%) of them reported low sleep efficiency. More than one-half (54.3%) of study subjects slept for 6-7 hours at night. While slightly less than one- fifth (19%) of them slept for 5-6 hours at night.

Table (II): Number and percent distribution of study subjects according to each domain of sleep quality

| Domains of sleep quality | Number =300 | Percent (%) |
|--|-------------|-------------|
| - Subjective sleep quality | | |
| • Very good | 72 | 24.0 |
| • Fairly | 156 | 52.0 |
| • Not bad | 67 | 22.3 |
| • Very bad | 5 | 1.7 |
| - Sleep disturbance` | | |
| • Not during the last week | 0 | 0.0 |
| • once a week | 36 | 12.0 |
| • Twice a week | 263 | 87.7 |
| • Three or more a week | 1 | 0.3 |
| -Sleep medication use | | |
| • Not during the last week | 232 | 77.3 |
| • once a week | 65 | 21.7 |
| • Twice a week | 3 | 1.0 |
| • Three or more a week | 0 | 0.0 |
| -Daytime dysfunction due sleepiness | | |
| • Not during the last week | 6 | 2.0 |
| • once a week | 2 | 0.7 |
| • Twice a week | 184 | 61.3 |
| • Three or more a week | 108 | 36.0 |
| -Sleep Latency minutes(SL) | | |

| | | |
|------------------------------------|-----|------|
| • < or 15 minutes | 7 | 2.3 |
| • 16-30 minutes | 128 | 42.7 |
| • 31-60 minutes | 137 | 45.7 |
| • >60 minutes | 28 | 9.3 |
| -Sleep Efficiency (SE)% | | |
| • >85%(high) | 9 | 3.0 |
| • 75-84% (average) | 65 | 21.7 |
| • 74-65% (low) | 192 | 64.0 |
| • <65%(very low) | 34 | 11.3 |
| -Sleep Duration(SD) / hours | | |
| • <7 hours(long) | 68 | 22.7 |
| • 6-7 hours(normal) | 163 | 54.3 |
| • 5-6 hours(short) | 57 | 19.0 |
| • >5 hours(very short) | 12 | 4.0 |

* Sleep latency: The duration of time from, lights out, or bedtime, to the onset of sleep

**Sleep efficiency = the duration of total sleep time to time in bed.

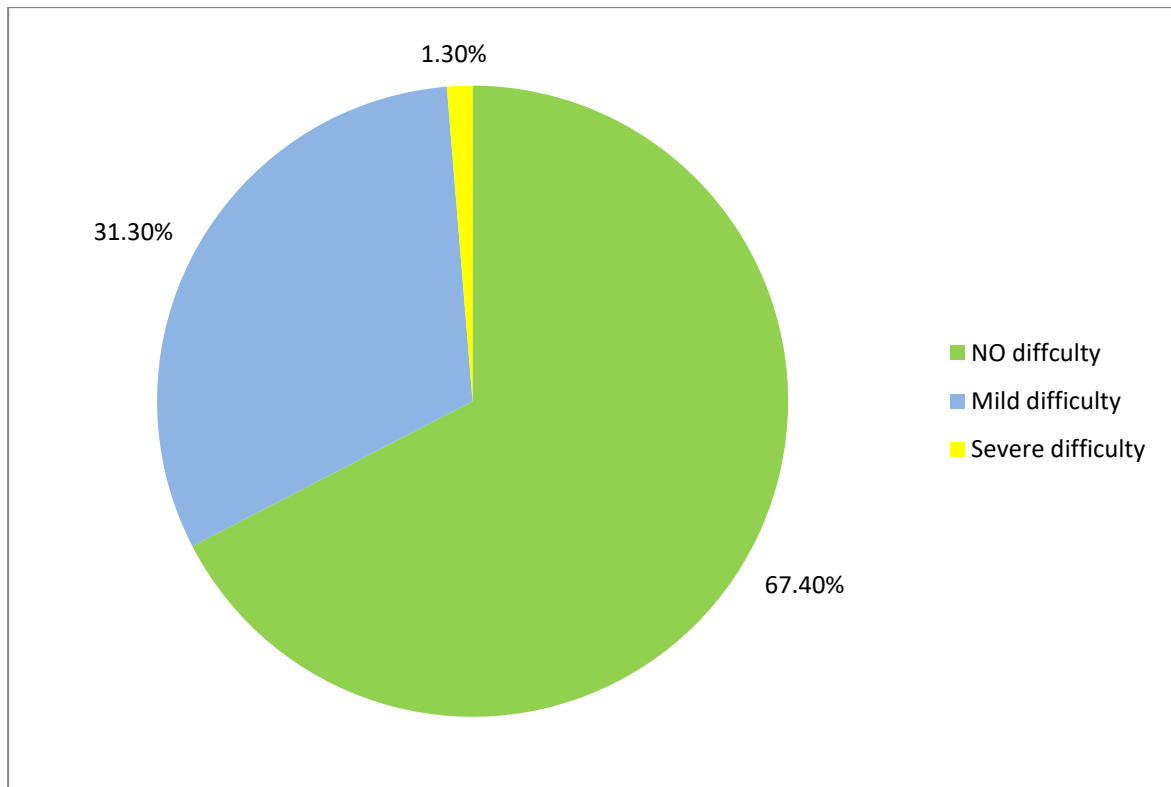


Figure (1): Number & percent distribution of the study subjects according to their total of sleep quality during pregnancy using Pittsburgh Sleep Quality Index (PSQI)

Figure (1): explicit that about two thirds (67.7%) of study subjects reported no difficulty during sleep. As much as 31.3% of them had mild difficulty compared to only 1.3% who had severe sleep difficulty.

The relationship between relationship between subjects' perceived quality of sleep and their socio-demographic characteristics is portrayed in table (III). Only level of education was statistically significantly associated with quality of sleep ($p = 0.016$). Specifically only 33% of the university graduates had a mild sleep difficulty compared to as much as 53.2% of those with secondary education. The same table indicates no statistically significantly correlation between study subjects other socio-demographic characteristics & their quality of sleep.

Table (III): Relationship between subjects’ perceived quality of sleep and their socio--demographic characteristics

| Socio-demographic Characteristics | PSQI | | | | | | X ² | P |
|-----------------------------------|---------------|------|-----------------|------|-------------------|-------|----------------|--------|
| | No difficulty | | Mild Difficulty | | Severe difficulty | | | |
| | No. | % | No. | % | No. | % | | |
| Age | | | | | | | | |
| • < 20 | 86 | 42.6 | 38 | 40.4 | 2 | 50.0 | 3.299 | 0.481 |
| • 20 - < 30 | 90 | 44.6 | 48 | 51.1 | 1 | 25.0 | | |
| • ≥30 | 26 | 12.8 | 8 | 8.5 | 1 | 25.0 | | |
| Level of education | | | | | | | | |
| • Illiterate | 7 | 3.5 | 1 | 1.1 | 0 | 0.0 | 14.288* | 0.016* |
| • Primary level | 23 | 11.4 | 12 | 12.7 | 3 | 75.0 | | |
| • Secondary level | 124 | 61.4 | 50 | 53.2 | 0 | 0.0 | | |
| • University or higher level | 48 | 23.7 | 31 | 33 | 1 | 25.0 | | |
| Occupation | | | | | | | | |
| • Housewives | 145 | 71.8 | 53 | 56.4 | 4 | 100.0 | 8.064 | 0.068 |
| • Worker | 44 | 21.8 | 31 | 33.0 | 0 | 0.0 | | |
| • Employer | 13 | 6.4 | 10 | 10.6 | 0 | 0.0 | | |
| Marital status | | | | | | | | |
| • Married | 201 | 99.5 | 91 | 96.8 | 4 | 100.0 | 4.458 | 0.141 |
| • Divorced | 1 | 0.5 | 3 | 3.2 | 0 | 0.0 | | |
| Residence | | | | | | | | |
| • Urban | 120 | 59.4 | 51 | 54.3 | 3 | 75.0 | 1.135 | 0.580 |
| • Rural | 82 | 40.6 | 43 | 45.7 | 1 | 25.0 | | |
| Family type | | | | | | | | |
| • Nuclear | 118 | 58.4 | 61 | 64.9 | 4 | 100.0 | 3.320 | 0.165 |
| • Extended | 84 | 41.6 | 33 | 35.1 | 0 | 0.0 | | |
| Perceived income | | | | | | | | |
| • Adequate | 16 | 7.9 | 8 | 8.5 | 0 | 0.0 | 0.158 | 0.873 |
| • Not adequate | 186 | 92.1 | 86 | 91.5 | 4 | 100.0 | | |

X²: Chi square test

*Significant at P ≤ 0.05

Table (IV) shows the relationship between subjects’ perceived quality of sleep and the profile of their recent pregnancy. Where as much as 63.8% of the subjects who had a full-term pregnancy reported mild sleep difficulty compared to only 36.2% of those who had a preterm pregnancy. Less than three quarters (73.3%) of the subjects who attended a satisfactory number of antenatal visits (≥4 visits) had no sleep difficulty compared to only 26.4% of those with unsatisfactory number of visits. In contrast 75% of the latter had severe difficulty compared to only 25% of pregnant women with 4 or more visits. The majority (94.7%) of pregnant women who reported presence of minor discomforts had mild sleep difficulty, compared to only 5.3% of those who did not reported them. Mild sleep difficulty was observed among 23.4%, 73.4% 34 and 25.5% of those who complained of fatigue, frequency of micturition, heart burn and backache, respectively. However, no statistically differences were found between subjects’ perceived quality of sleep and the profile of their recent pregnancy.

Table (IV): Relationship between subjects’ perceived quality of sleep and the profile of their recent pregnancy

| Profile of current pregnancy | PSQI | | | | | | X ² | P |
|-----------------------------------|---------------|------|-----------------|------|-------------------|------|----------------|-------|
| | No difficulty | | Mild difficulty | | Severe difficulty | | | |
| | No. | % | No. | No. | % | No. | | |
| Weeks of gestation | | | | | | | | |
| ▪ Preterm (<37 weeks) | 63 | 31.2 | 34 | 36.2 | 2 | 50.0 | 1.482 | 0.523 |
| ▪ Full-term (37-42 weeks) | 139 | 68.8 | 60 | 63.8 | 2 | 50.0 | | |
| Number of antenatal visits | | | | | | | | |
| • < 4 visits | 54 | 26.7 | 28 | 29.8 | 3 | 75.0 | 4.187 | 0.109 |
| • ≥ 4 visits | 148 | 73.3 | 66 | 70.2 | 1 | 25.0 | | |

| | | | | | | | | | |
|--------------------------------------|-----|------|----|------|---|-------|-------|-------|-------|
| Presence of minor discomforts | | | | | | | | | |
| • Yes | 189 | 93.6 | 89 | 94.7 | 4 | 100.0 | | 0.282 | 0.841 |
| • No | 13 | 6.4 | 5 | 5.3 | 0 | 0.0 | | | |
| Presence of minor discomforts | | | | | | | | | |
| • Nausea /vomiting | 15 | 7.4 | 12 | 12.8 | 0 | 0.0 | 2.288 | | 0.314 |
| • Fatigue | 55 | 27.2 | 22 | 23.4 | 2 | 50.0 | 1.853 | | 0.366 |
| • Frequency of micturition | 165 | 81.7 | 69 | 73.4 | 4 | 100.0 | 3.121 | | 0.161 |
| • Dizziness & fainting | 6 | 3.0 | 4 | 4.3 | 0 | 0.0 | 0.972 | | 0.760 |
| • Dyspnea | 12 | 5.9 | 3 | 3.2 | 0 | 0.0 | 1.118 | | 0.518 |
| • Heart burn | 77 | 38.1 | 32 | 34.0 | 1 | 25.0 | 0.664 | | 0.719 |
| • Excessive salivation | 19 | 9.4 | 10 | 10.6 | 0 | 0.0 | 0.222 | | 0.898 |
| • Backache | 35 | 17.3 | 24 | 25.5 | 0 | 0.0 | 3.106 | | 0.186 |
| • Excessive vaginal discharge | 42 | 20.8 | 30 | 31.9 | 0 | 0.0 | 4.956 | | 0.080 |
| • Supine hypotension | 3 | 1.5 | 1 | 1.1 | 1 | 25.0 | | | |

X²: Chi square test

*Significant at P ≤ 0.05

The Relationship between study subjects' perceived quality of sleep and their maternal outcome is portrayed in table (V) only indicate maternal distress was statistically significantly correlated with their perceived quality of sleep (P = 0.004). Specifically, the majority (80.9%) of the study subjects had mild sleep difficulty did experience maternal distress compared to only 19.1% of those who had not maternal distress during labor. The majority (88.6% & 86.2%) of study subjects who had no or mild sleep difficulty exhibited spontaneous rupture of membrane during labor, respectively. The same table indicates no statistically significant correlation between the study subjects' other maternal outcomes.

Table (V): Relationship between study subjects' perceived quality of sleep and their outcome

| Maternal outcome | PSQI | | | | | | X ² | p |
|--------------------------------------|---------------|------|-----------------|------|-------------------|-------|----------------|--------|
| | No difficulty | | Mild difficulty | | Severe difficulty | | | |
| | No | % | No. | No | % | No. | | |
| Presence of maternal distress | | | | | | | | |
| • Yes | 17 | 8.4 | 76 | 80.9 | 2 | 50.0 | 11.067* | 0.004* |
| • No | 185 | 91.6 | 18 | 19.1 | 2 | 50.0 | | |
| Mode of ROM | | | | | | | | |
| • Spontaneous | 179 | 88.6 | 81 | 86.2 | 3 | 75.0 | 1.607 | 0.419 |
| • Artificial | 23 | 11.4 | 13 | 13.8 | 1 | 25.0 | | |
| Type of ROM | | | | | | | | |
| • Mature | 196 | 97.0 | 90 | 95.7 | 4 | 100.0 | 0.972 | 0.765 |
| • Premature | 6 | 3.0 | 4 | 4.3 | 0 | 0.0 | | |
| Types of delivery | | | | | | | | |
| • Vaginal(NVD) | 115 | 56.9 | 49 | 52.1 | 1 | 25.0 | 2.009 | 0.346 |
| • C.S | 87 | 43.1 | 45 | 47.9 | 3 | 75.0 | | |
| Duration of labor | | | | | | | | |
| • Short | 11 | 5.4 | 4 | 4.3 | 0 | 0.0 | 2.267 | 0.870 |
| • Normal | 97 | 48.0 | 42 | 44.7 | 1 | 25.0 | | |
| • Long | 7 | 3.5 | 3 | 3.2 | 0 | 0.0 | | |
| Complication during labor | | | | | | | | |
| • Yes | 10 | 5.0 | 7 | 7.4 | 1 | 25.0 | 3.671 | 0.156 |
| • No | 192 | 95.0 | 87 | 92.6 | 3 | 75.0 | | |
| Types of complications | | | | | | | | |
| • Prolonged labor | 6 | 3.0 | 4 | 4.3 | 0 | 0.0 | 10.792 | 0.120 |
| • Genital injury | 3 | 1.5 | 1 | 1.1 | 0 | 0.0 | | |
| • Hemorrhage | 1 | 0.5 | 2 | 2.1 | 1 | 25.0 | | |

ROM: rupture of membrane

X²: Chi square test

*Significant at P ≤ 0.05

According to table (VI) a statistically significant correlation is observed between study subjects and quality of sleep & some of their fetal outcomes. Namely: fetal status (P = 0.015), Apgar score at one minute (p=0.001& Apgar score at five minutes (P = 0.002). Specifically, the majority (98.5 % & 93.6%) of subjects who had either no or mild sleep difficulty delivered alive newborn, respectively. according to Apgar score at one minute, more than one half (56.4%) of those who had no sleep difficulty during pregnancy delivered newborn with severe asphyxia compared to 73.4%. compared to as much as 75% of them who had mild sleep difficulty. However, Apgar score at five minutes it was found that mild asphyxia was observed among the majority (93.6% & 83%) of those with either no or mild sleep quality compared to 50% of those who had poor sleep, respectively.

Table (VI): Relationship between study subjects’ perceived quality of sleep and their fetal outcomes

| Neonatal outcomes | PSQI | | | | | | X ² | p |
|--|---------------|-------|-----------------|-------|-------------------|-------|----------------|---------|
| | No difficulty | | Mild difficulty | | Severe difficulty | | | |
| | No | % | No. | No | % | No. | | |
| Presence of fetal distress | | | | | | | | |
| • Yes | 1 | 0.5 | 2 | 2.1 | 0 | 0.0 | 3.258 | 0.267 |
| • No | 201 | 99.5 | 92 | 97.9 | 4 | 100.0 | | |
| Fetal status | | | | | | | | |
| • Alive | 199 | 98.5 | 88 | 93.6 | 3 | 75.0 | 12.707* | 0.015* |
| • Stillborn | 1 | 0.5 | 4 | 4.3 | 1 | 25.0 | | |
| • Intrauterine fetal death | 2 | 1.0 | 2 | 2.1 | 0 | 0.0 | | |
| APGAR score at one minutes | | | | | | | | |
| • Normal 7-10 | 3 | 1.5 | 6 | 6.4 | 1 | 25.0 | 22.284* | <0.001* |
| • Mild asphyxia 4-6 | 85 | 42.1 | 19 | 20.2 | 0 | 0.0 | | |
| • Severe asphyxia 0-3 | 114 | 56.4 | 69 | 73.4 | 3 | 75.0 | | |
| APGAR score at five minutes | | | | | | | | |
| • Normal 7-10 | 3 | 1.5 | 6 | 6.4 | 1 | 25.0 | 15.659* | 0.002* |
| • Mild asphyxia 4-6 | 189 | 93.6 | 78 | 83.0 | 2 | 50.0 | | |
| • Severe 0-3 | 10 | 5.0 | 10 | 10.6 | 1 | 25.0 | | |
| Intra –uterine growth restriction | | | | | | | | |
| • Yes | 3 | 1.5 | 1 | 1.1 | 0 | 0.0 | 1.363 | 1.000 |
| • No | 199 | 98.5 | 93 | 98.9 | 4 | 100.0 | | |
| Meconium aspiration | | | | | | | | |
| • Yes | 181 | 89.6 | 81 | 86.2 | 3 | 75.0 | 2.110 | 0.316 |
| • No | 21 | 10.4 | 13 | 13.8 | 1 | 25.0 | | |
| Caput succedaneum | | | | | | | | |
| • Present | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | - | - |
| • Absent | 202 | 100.0 | 94 | 100.0 | 4 | 100.0 | | |

X²: Chi square test

*Significant at P ≤ 0.0

Table (VII) manifests the relationship between Relationship between study subjects’ perceived quality of sleep and their Neonate’s measurement. The weight of the neonate was within the normal range (2.5-3.5 kg) among 66% of their mothers who had no sleep difficulty compared to more than two fifths (44%) among those with mild sleep difficulty. The length of the neonates was within normal range (48-53 cm) among the majority (94.1% & 85.1%) of their mothers who had either no or mild sleep difficulty, respectively. However, it was below normal range (<48 cm) for 50% of their mothers who had severe sleep difficulty. In addition, head circumference of the neonates was within normal range (33-35.5 cm) among (61.9% & 47.9%) of their mothers who had either no or mild sleep difficulty, respectively. However, it was below normal range (<33 cm) among 75% of mothers’ neonates with severe sleep difficulty. Furthermore, chest circumference of the neonates was within normal range (30-35 cm) among as much as 44.1 % of their mothers who had no sleep difficulty compared to only 28.7% among those who had mild sleep difficulty.

Table (VII): Relationship between study subjects' perceived quality of sleep and their Neonate's measurement

| Neonate`s measurement's | PSQI | | | | | | X ² | p |
|---------------------------------|---------------|------|-----------------|------|-------------------|------|----------------|---------|
| | No difficulty | | Mild difficulty | | Severe difficulty | | | |
| | No | % | No. | No | % | No. | | |
| Weight (Kg) | | | | | | | | |
| • <1.5 | 6 | 3.0 | 7 | 7.4 | 1 | 25.0 | 34.897* | <0.001* |
| • 1.5-2.5 | 18 | 8.9 | 30 | 31.9 | 2 | 50.0 | | |
| • 2.5-3.5 | 134 | 66.3 | 42 | 44.7 | 1 | 25.0 | | |
| • ≥3.5 | 44 | 21.8 | 15 | 16.0 | 0 | 0.0 | | |
| Length (cm) | | | | | | | | |
| • <48cm | 12 | 5.9 | 14 | 14.9 | 2 | 50.0 | 11.626* | 0.003* |
| • 48-53cm | 190 | 94.1 | 80 | 85.1 | 2 | 50.0 | | |
| Head circumference (cm) | | | | | | | | |
| • <33 cm | 77 | 38.1 | 49 | 52.1 | 3 | 75.0 | 6.727* | 0.028* |
| • 33-35.5 cm | 125 | 61.9 | 45 | 47.9 | 1 | 25.0 | | |
| Chest circumference (cm) | | | | | | | | |
| • <30.5 cm | 113 | 55.9 | 67 | 71.3 | 3 | 75.0 | 6.672* | 0.027* |
| • 30.5-33 cm | 89 | 44.1 | 27 | 28.7 | 1 | 25.0 | | |

* Significant at P ≤ 0.05

4. DISCUSSION

Sleep is essential for a person's health and wellbeing, according to the National Sleep Foundation (NSF). Yet millions of people do not get enough sleep and may suffer from lack of sleep. Sleep quality change throughout pregnancy leads to fatigue, stress and poorer mental, physical health. Moreover prolonged poor sleep quality can decrease women's ability to perform their duties and are likely to increase pregnancy adverse outcomes, including gestational diabetes and preeclampsia. Meanwhile, prevention of adverse pregnancy outcomes is one of the most important goals of health care provider. Consequently pregnant women are an important target group to improve sleep, yet the challenge lies in finding an adequate and safe treatment, instead of which rely on pharmacological treatment which is not recommended for pregnant women. Indeed nurses play a vital role to improve the quality of sleep among pregnant women through nursing managements strategies which in turns decreases its adverse effects on pregnancy outcomes⁽¹⁸⁾. So, this study was aimed to identify relationship between quality of sleep and pregnancy outcomes among primipara.

The present study revealed no statistically significantly correlation between *age* and *quality of sleep* among study subjects. This result is in line with the findings of four other researches. First **Yucel SC et al. (2012)**⁽¹⁹⁾, who assessed sleep quality and related factors in pregnant women in **Izmir – Turkey**. Second **Cai et.al.(2013)**⁽²⁰⁾ who studied the prevalence and associated factors of sleep disorder – related symptoms in pregnant women in **China**. Third **Dolatain et al. (2014)**⁽²¹⁾ who investigated the effect of impaired sleep on preterm labor in **Tehran**. All they reported that there was no significant difference between age and sleep quality during pregnancy. On other hand, the same result inconsistent with the findings of a study done by **Mohamed D (2015)**⁽²²⁾ who assessed patterns of sleep among pregnant women in **Egypt**. Her result showed a significant correlation between age and sleep quality.

Level of education in the current study was statistically significantly associated with quality of sleep. However, this result goes in line with the findings of Rezaei E et al (2012)(23) who had studied quality of life in pregnant women with sleep disorder in Tehran. They found that there was significant difference between level of education and sleep quality among pregnant women. This agreement is kind of expected since women with high education level usually pave the way to adapt health lifestyle and more health information seeking utilization.

Yet, two other studies had reported an inverse correlation between level of education and sleep quality. First Kazemi el.al (2016) (24) who conducted a study about assessment scales, associated factors and the quality of life score among pregnant women in Iran. Second previously mentioned study done by Dolatain et al (2014)(21). They all reported no significant relationship between poor sleep quality during pregnancy and education level.

In the present study sleep quality was not associated either with mothers' occupation or income. This result was unexpected since the financial inadequacies may cause pregnant women to be so preoccupied with her depleted circumstances to meet family demands which create stress and negative influence on expected mother's quality of sleep. This result is supported by the findings of other two researches. First Kachikis et.al (2012)(25) who studied predictors of sleep characteristics among women in Texas, USA. Second Taskiran N. (2011)(26) who conducted a study titled pregnancy and sleep quality in Turkey. Both studies show no statistically different between level of income, occupation and quality of sleep during pregnancy.

However, this result is inconsistent with the findings Hung et.al (2014) (27) who carried out a study about association between prenatal sleep quality and obstetric outcome. Moreover with the aforementioned Egyptian study done by Mohamed D (2015)(22). They observed unemployed status was correlated with poor sleep quality.

In profile of current pregnancy, the present study revealed no statistically significant difference between study subjects week of gestation and their quality of sleep. This result is in line with Okun et al (2010) (28) who carried out a study about how distributed sleep may be risk factor for adverse pregnancy outcomes in Pennsylvania. They found that no differences between sleep quality and weeks of pregnancy. In addition to Hall et al (2009) (29) who had study about race and financial strain are independent correlates of sleep in midlife women. They found no statistical correlation between week of gestation and quality of sleep.

This result was unexpected whereas the physiologic changes during pregnancy cause sleep disturbance. In the first trimester, total sleep time is decreased to 8.2 hours due to primary reasons nausea and vomiting, back ache and urinary frequency. During the second trimester total sleep time is decreased to 8 hours because of heartburn and leg cramps. While in 3rd trimester it decreased to 7.8 hours due to fetal movement become increasingly disruptive, more daily naps as well as breathing problems. These changes possibly potentiated by hormonal changes such as rising in progesterone and cortisol levels which observed with increased gestational age (30).

On other hand this result inconsistent with the findings of Jamalzehe A et.al (2017) (31) who carried out study about evaluation of sleep quality in third trimester of pregnancy and its relation to birth characteristics in women in Iran. They found that sleep often becomes increasingly disturbed as pregnancy progresses, characterized by more restless sleep, frequent nocturnal awakenings, and a decline in total sleep time.

Number of antenatal visits in the present study had no statistically significant difference with quality of sleep. This is kind of perplexing; because the antenatal visit probably entail health education and visualization of the fetus through ultrasound which is expected to relieve anxiety about fetus health, consequently enhance sleep quality level. Additionally antenatal visits ensure pregnant women's wellbeing during pregnancy which positively impact on their sleep quality level. On other hand, this result is disharmony with aforementioned study done by Taskiran et.al (2011). (26) They found there was statistical difference between frequency of antenatal visit and quality of sleep in favor of regular antenatal visits.

Presence of Minor discomforts had no statistical significant correlation with quality of sleep during pregnancy. This result is incongruent with previously mentioned study conducted by facoo et al (4) (2010) who had studied sleep disturbances among women in Chicago, New York. They found sleep efficiency is affected by minor discomfort such as heartburn, backache, and dyspnea which associated with sleep disturbance.

Maternal outcomes

The results of present study showed statistically significant difference between quality of sleep and maternal distress. this is could be attributed to fact that sleep is not a passive state but is an active process in which memory consolidation, tissue restoration metabolic and hemostatic process affected. Moreover sleep disorders during pregnancy is lead to episodes of hypoxia thus in turn lead to oxidative stress and subsequent increase in inflammation process. This inflammation process is associated development of cardiovascular diseases, hypertension as well as gestational diabetes during pregnancy (32).

This result is in line with Micheli K et al (2011)(33) who studied sleep patterns in late pregnancy and risk of preterm birth and fetal growth restriction in Greece. They found women with sleep deprivation (≤ 5 hours sleep) were at high risk for maternal distress and preterm births.

Time of rupture of membrane was no statistically significant correlated with quality of sleep. This finding disagrees with findings of three other researches. First Qiu et.al (2015)(34) who had study about maternal sleep duration and complaints of vital exhaustion during pregnancy in USA. Second Hernández-Díaz S et.al (2014)(35) who examined triggers of spontaneous preterm delivery why today? in Boston, USA. Third Kajeepeta et.al (2014)(36) who carried out study about sleep duration, vital exhaustion and odds of spontaneous preterm birth: a case control study in USA. They all found that significant disrupted sleep quality associated with premature rupture of membrane.

Type of delivery in the present study was not statistically significant correlated with quality of sleep. This result is supported by Meharaban et.al (2015) (37) who had study titled restless legs syndrome during pregnancy and preterm birth in Iran. They observed that there was no statistically significant correlation with quality of sleep and type of delivery. On contrary Zafarghandi N (2012)(38)& Naghi I et.al (2012) (39). They all reported that pregnant women with poor sleep quality during pregnancy were more likely to undergoes cesarean section and had long labor duration.

Fetal outcomes

The finding of the current study revealed that there was statistically significant correlation with quality of sleep and fetal outcome specifically fetal status, AGAR score fetal weight, height as well as head and chest circumference. This could be attributed to the fact that pregnant women with sleep disturbance may have adverse effect on fetus in particular fetal hypoxia which leading to systemic inflammation and elevation in the number of circulating nucleated red blood cells with decreased fetal wellbeing. Moreover, possible mechanism for effect of poor sleeping position is associated with inhibition of venous return by compression and reduction of uterine blood flow as well as reduction in fetal oxygen saturation (40).

This result is supported by the aforementioned study done by Jamalzahi A et.al (2017) (31) they found that a significant relationship was observed between sleep disorder of pregnant mother and birth weight of the babies during the third 3 months of pregnancy. In addition to Zafarghandi N (2012)(38) who had study titled the effects of sleep quality and duration in late pregnancy on labor and fetal outcome. They observed that sleep duration and quality of sleep can affect the type of delivery, length of labor stages, as well as neonates' Apgar score and birth weight. They also found that sleep duration of more than 8 hours was with higher Apgar score (greater than 7) compared with reported sleep duration less than 7 hours.

5. CONCLUSION AND RECOMMENDATIONS

Conclusion:

Based on the findings of the present study, it can be concluded that around less than one third study subjects had mild sleep difficulty while two thirds of them reported none sleep difficulties. Fortunately low percent suffered from severe sleep difficulty. Moreover a significant association between sleep difficulties and some of sociodemographic, maternal and newborn related factors was evident. Such as low level of education, maternal distress, fetal distress, low APAGR as well as neonatal measurements.

Recommendations:

Based on the findings of the present study, the following recommendations are suggested:

- Sleep quality during pregnancy and its associated factors are suggested to be included in maternity curricula at the related educational settings.
- In antenatal clinics, health care providers would better include sleep quality within their pregnant women' assessment.
- Maternity nurses are advised to gear their care towards intervening with some factors that shape mothers' sleep quality during pregnancy.

Further researches are to explore:

- Repeating the same study widely in different cultures of Egypt.
- Ongoing researches throughout all Governorate of Egypt are needed to defined the underlying causes of sleep disturbances.

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