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The Association of Maternal Sleep Quality with Newborn Health

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ABSTRACT

Sleep disturbances in pregnancy according to the literature, they can affect newborn outcomes also can impact the growth and development of the baby.This study evaluated the effect of maternal sleep quality with newborn health. The research design was a cross-sectional study.The sample of this study were mothers who gave birth by cesarean delivery method with gestational age ≥ 37 weeks without complications, totally 78 pregnant women. The maternal sleep quality were assessed by PSQI questionnaire. Newborn Health (neonatal birth weight, body length and APGAR SCORE) were assessed by neonatal medical record. BDNF levels checked using the ELISA. Data were analyzed by Independent T-test and Mann-Whitney Test. There was no significant association between Maternal Sleep Quality with neonatal birth weight (p= 0,177).There were significant association between Maternal sleep quality with body length and APGAR SCORE of neonates with p value <0.05 (p = 0.025)(p=0,002). There was also a significant relationship between maternal sleep quality and neonatal cord blood BDNF levels (p=0.00). Sleep disturbances can impact obstetric conditions and newborn health. In this study there was no significant relationship between maternal sleep quality with neonatal birth weight.

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INTRODUCTION

Sleep is a basic human need for health as important as diet and exercise. Good quality sleep, and adequate sleep duration in pregnancy, are very important not only to restore physical agility, mental problems and the effects of daily activities but also can affect the growth, health of the fetus and placenta. The prevalence of sleep disturbances gradually increases with the duration of pregnancy (Yang et al., 2020). Problems with sleep disturbances are often encountered during the third trimester of pregnancy or near delivery (Jemere, 2021). The prevalence rate of poor quality sleep for pregnant women during pregnancy increases to 96%. More than two thirds of pregnant women have poor sleep quality in the world (Kriengtuntiwong, Zaw, & Taneepanichskul, 2021).

Sleep disturbance in mothers during pregnancy is a health problem experienced by many pregnant women in the world. *The American Academy of Sleep Medicine* reports sleep disturbances due to physical discomfort related to pregnancy for example; nausea, lower back pain, leg cramps, and fetal movements; frequent urination, or labor pain and the influence of psychosocial factors such as depression, inadequate social support, higher stress, and anxiety related to the health and development of the fetus. Maternal sleep disorders During pregnancy, inferior sleep quality, short sleep duration, and sleep-disordered breathing, can lead to maternal morbidity and adverse birth outcomes, such as premature delivery, low birth weight, low APGAR Score and asphyxia (Hung, Ko, & Chen, 2014).

In line with the results of a study by Peltonen et al (2022) which stated that poor sleep quality, especially in early pregnancy (14-16 weeks) and late pregnancy can affect the health of newborns. Another study in Iran of 88 mothers found that women who were sleep deprived (6.45 ± 2.07 hours vs. 8.47 ± 1.86 hours) had a longer duration of labor and a 20% higher risk of cesarean delivery. Recent research reports that pregnant women with poor quality sleep can increase the risk of impaired growth and development of the baby, such as low birth weight and shorter babies. In this study, no relationship was found between sleep quality and APGAR scores (Peltonen et al., 2022).

According to research by Kriengtuntiwong et al (2021) in Thailand, the poor sleep quality of pregnant women can affect Brain Derived Neurotropin Factor (BDNF) levels. In line with the study of Fan et al, (2019) Pregnant women with poor sleep quality have BDNF levels 3 times lower than mothers with good sleep quality (Fan et al., 2019). Low BDNF levels can cause neurodevelopmental disorders, cognitive disorders, and emotional disturbances in future babies (Kriengtuntiwong et al., 2021). Lack of sleep disrupts endocrine function, as well as neurodevelopment and cognitive impairment. Sleep disturbances can modulate stress and then activate the hypothalamus-pituitary-adrenal (HPA) axis which causes an increase in cortisol secretion and an increase in cortisol concentration can suppress BDNF production (Fan et al., 2019). Poor quality sleep for pregnant women can cause endocrine function disorders, immune disorders, fetal neurodevelopment, and fetal cognitive development and affect learning and emotional abilities in offspring (Peltonen et al., 2022; Polo-Kantola, Aukia, Karlsson, Karlsson, & Paavonen, 2017).

Sleep disturbances and psychological problems can impact obstetric conditions and have detrimental effects on the mother and the infant (Huizink et al., 2016). In practice, health workers focus on prevention, treatment, and intervention in the physical and intrauterine environment of pregnant women, meanwhile ignoring sleep disturbances and psychological problems in pregnant women. Previous studies have reported that sleep disturbances are associated with infant health such as birth weight, length, APGAR Score, and BDNF. This study aims to determine whether there is a relationship between the quality of sleep of pregnant women and the health of newborns.

RESEARCH METHOD

This research is an observational study with a cross-sectional design. This research was conducted from November 2021 to June 2022 and was approved by the Andalas University research ethics committee with number 677/UN.16.2/KEP-FK/2022. Maternity mothers with gestational age ≥37 weeks by cesarean section delivery method without complicating diseases and willingness to participate were used as research subjects. Exclusion criteria in this study were pregnant women who had pre-eclampsia/eclampsia, pregnant women with diabetes, pregnant women who were obese, pregnant women with systemic infections, pregnant women with anemia, pregnant women who were active smokers, and pregnant women who consumed alcohol.

Patients who met the requirements were identified as research subjects through collaboration in three medical institutions located in Padang, West Sumatra, namely Hermina Hospital, Reksodiwiryo Hospital, Andalas University Hospital. 78 Maternity mothers who met the

requirements and agreed to participate in this study were informed consent. The sleep quality of pregnant women was assessed using the Pittsburgh Sleep Quality Index (PSQI) questionnaire. Assessment of the baby's birth weight, baby length, and APGAR Score was carried out by health workers and then the researchers looked at the data from the baby's medical record. The neonatal's umbilical cord blood was taken from the maternal department in the operating room during the cesarean section delivery process. BDNF levels were examined at the Biomedical Laboratory of Andalas University Padang using the enzyme-linked immunosorbent assay (ELISA) method. The statistical test used in this study was the Independent T-test, a non-parametric test with Mann-Whitney using the SPSS version 22 program.

RESULTS AND DISCUSSIONS

In this research, the statistical test used on normally distributed data is the parametric Independent T-test for data that is not normally distributed with the non-parametric test, namely the Mann-Whitney.

Table 1. Frequency Distribution of Sleep Quality in Pregnant Women at Several Hospital in Padang City

Maternal Sleep Quality	F	%
Good	15	19,2
Poor	63	80,8
Total	78	100%

Based on the results of statistical analysis in Table 1, It was known that of 78 pregnant women nearing delivery at the Padang city hospital, 15 women (19.2%) experienced good sleep quality. As many as 63 pregnant women (80.8%) experienced poor sleep quality in Padang City Hospital. This shows that many pregnant women experience sleep disturbance, in Padang city hospitals.

Table 2. The Relationship between Maternel Sleep Quality with Neonatal Birth Weight

Maternal Sleep	Neonatal Birth Weight			P Value
Quality	n(%)	Mean ± SD	Min-Max	
Poor	15(19.2)	3038,1 ± 353,99	2300-3886	
Good	63(80,8)	3216±*453,95*	2346-4326	0,177[a]
Total	78(100)			

Mann-Whitney Test[a]

Based on the results of the Mann Whitney statistical analysis in table 2, it is known that there is no significant relationship between the sleep quality of pregnant women and the neonatal's birth weight with a p-value > 0.05

Table 3. The Relationship between Maternel Sleep Quality with Neonatal Length

Maternal Sleep	Neonatal Lenght			P Value
Quality	n(%)	Mean±SD	Min-Max	
Poor	15(19.2)	47,8±1,188	45-51	
Good	63(80,8)	48,69±1,702	45-52	0.025[a]
Total	78(100)			

Mann-Whitney Test[a]

Based on the results of the Mann Whitney statistical analysis in table 3, it is known that there is a significant relationship between maternal sleep quality and the length of the neonatal with a p-value <0.05.

Table 4. The Relationship between Maternel Sleep Quality with APGAR-Score

Maternal Sleep Quality	APGAR Score			P Value
	n(%)	Mean±SD	Min-Max	
Poor	15(19.2)	7,43±0,661	6-8	
Good	63(80,8)	8,00±0.00	8-8	0.002[a]
Total	78(100)			

Mann Whitney Test[a]

Based on the results of the Mann Whitney statistical analysis in table 4, it is known that there is a significant relationship between maternal sleep quality and the APGAR Score of the neonatal with a p-value <0.05.

Table 5. The Relationship between Maternel Sleep Quality with Neonatal-BDNF levels

Maternal Sleep Quality	Neonatal BDNF Level's				P Value
	n(%)	Mean±SD	SD	T	
Poor	15(19.2)	1,673	0.188		
Good	63(80,8)	1,949	0.199	-4,851	0.000[b]
Total	78(100)				

Independent-T Test[b]

T-Independent analysis results, different tests on the mean value of BDNF levels based on the sleep quality group, showed that there were differences in the mean value of Brain-Derived Neurotrophic Factor (BDNF) levels based on the sleep quality group, so it can be concluded that there is a significant relationship between sleep quality and the levels of Brain-Derived Neurotrophic Factor (BDNF) in the neonatal's umbilical cord blood in mothers giving birth this can be seen from the p-value < 0.05, namely p = 0.000

Discussion

Hasil penelitian yang telah dilakukan diperoleh hasil bahwa dari 78 ibu hamil yang mendekati waktu persalinan di rumah sakit kota Padang diperoleh sebanyak 13 ibu hamil (16,7%) mengalami kualitas tidur yang baik, kemudian sebanyak 65 ibu hamil (83,3 %) mengalami kualitas tidur yang buruk di rumah sakit kota Padang, sehingga disimpulkan bahwa banyak ibu hamil yang mengalami kualitas tidur yang buruk di rumah sakit kota Padang. Sejalan dengan penelitian Wong et al (2022) yang menyatakan bahwa banyak ibu hamil mengalami gangguan tidur subyektif, kualitas tidur yang buruk, tidur malam yang tidak cukup, kantuk di siang hari dan terbangun di malam hari, hingga 76,3% wanita hamil, dengan prevalensi meningkat menjadi 83,5% setelah usia kehamilan 8 bulan. Perubahan tidur selama kehamilan mencerminkan perubahan beberapa aspek tubuh-pikiran yang dimodifikasi termasuk faktor anatomis, fisiologis, hormonal dan psikologis (Silvestri & Arico, 2019; Wong, D'Cruz, & Hare, 2022).

Pada penelitian ini penlaian kualitas tidur ibu bersalin yang peneliti gunakan adalah kuesioner *Pitssburgh Sleep Quality Index* yang tidak hanya menilai kualitas tidur, durasi tidur, tapi juga latensi tidur, efisiensi tidur, gangguan tidur, disfungsi aktivitas siang hari, dan penggunaan obat tidur. Dari 7 item yang dinilai didapatkan hasil bahwa banyak ibu hamil yang memiliki kualitas tidur yang buruk, dan durasi tidur yang kurang dari 7 jam. Ibu hamil juga sering ditemui mengalami gangguan latensi tidur atau sulit untuk memulai tidur.Kebanyakan dari ibu hamil mengatakan sulit memulai tidur dikarenakan mempunyai masalah gangguan fisik seperti sesak nafas, nyeri pinggang, susah mencari posisi tidur yang nyaman, sering buang air kecil. Berdasarkan hasil penelitian juga ditemukan bahwa ibu hamil ketika sudah di tempat tidur tidak langsung tertidur karena susah memulai tidur dikarenakan masalah psikologis seperti mengalami kecemasan, banyak fikiran dan ketakutan terkait kehamilan, atau terkait masalah pribadi lainnya sehingga mereka mengalihkan dengan cara memainkan handphone yang menyebabkan mereka semakin susah tertidur.

Banyak ibu hamil yang efisiensi tidurnya terganggu karena sering terbangun dimalam hari karena ingin buang air kecil, atau terbangun karena ibu masih punya balita dan ketidaknyamanan perubahan fisik lainnya terkait kehamilan. Ketika ibu hamil sudah terbangun ditengah malam, mereka mengatakan susah untuk memulai tidur kembali. Hal ini membuat ibu hamil memiliki durasi tidur yang kurang serta tidur yang tidak efektif. Akibat kualitas tidur dan durasi tidur yang buruk, menyebabkan munculnya perasaan tidak segar di pagi hari, frekuensi mengantuk yang sering pada siang hari, sulit untuk konsentrasi dan mudah letih. Hal ini menggangu aktivitas sosial, selain itu juga membuat mereka kurang bersemangat dalam menjalankan pekerjaan atau kegiatan disiang hari. Dari hasil penelitian yang dilakukan tidak ada ibu hamil yang menggunakan obat tidur agar bisa tertidur. Mereka masih mengupayakan untuk bisa tertidur tanpa minum obat tidur meskipun durasi tidurnya kurang.

Menurut penelitian Pitsillos et al., (2021) gangguan tidur dianggap sebagai salah satu gejala paling menonjol pada pasien depresi. Gangguan tidur merupakan faktor risiko munculnya depresi, tetapi juga merupakan prediktor depresi. Gangguan tidur yang umum terkait dengan depresi adalah latensi tidur yang berkepanjangan, susah untuk mempertahankan tidur, dan menyebabkan kurangnya waktu tidur total. Dalam kehamilan, masalah gangguan tidur memainkan peran utama dalam perkembangan depresi pada maternal (Pitsillos et al., 2021).Hasil studi terbaru oleh Bao et al (2022) menyatakan bahwa gangguan tidur selama hamil dikaitkan dengan faktor sosial, psikologis, dan fisiologis. Ditemukan bahwa banyak faktor yang menyebabkan gangguan tidur seperti usia, paritas, pendapatan, pendidikan, dukungan keluarga dan dukungan sosial. Selain itu gangguan tidur juga dapat berhubungan dengan perubahan hormonal pada semasa kehamilan (Bao et al., 2022).

Sejalan dengan penelitian Khoury et al (2021) yang menyatakan bahwa usia, status perkawinan, status sosial ekonomi rendah, pekerjaan selama kehamilan, jumlah anak, jarak anak terakhir, usia kehamilan, perokok pasif atau perokok aktif dan minum alkohol, berhubungan dengan durasi tidur pada wanita hamil (Khoury, Atkinson, Bennett, Jack, & Gonzalez, 2021). Studi sebelumnya juga menunjukkan bahwa kualitas tidur yang buruk dikaitkan dengan berbagai faktor sosiodemografi, termasuk tempat tinggal, minoritas, hal ini menyebabkan durasi tidur kurang dari 7 jam di antara wanita hamil (Xu, Liu, Zhang, Sharma, & Zhao, 2017). Pada penelitian yang telah peneliti lakukan, peneliti tidak memasukkan responden yang merokok dan minum alcohol sehingga memperkecil kemungkinan terjadi terjadi bias.

Hasil penelitian yang sudah peneliti lakukan bahwa banyak ibu hamil mengatakan sering mengalami gangguan tidur disebabkan oleh beban pekerjaan selama hamil yang membuat ibu hamil kurang tidur, ibu hamil juga mengatakan mengalami gangguan tidur karena masih punya balita sehingga sering terbangun jika balita menangis dan terjaga, gangguan tidur juga sering terjadi karena usia kehamilan yang semakin besar sehingga perubahan-perubahan fisik dan hormonal selama kehamilan menyebabkan ketidaknyamanan saat tidur. Lebih lanjut, ibu hamil rentan mengalami kesulitan tidur dan masalah tidur selama kehamilan terkait erat dengan depresi dan kecemasan karena memikirkan kondisi kehamilan, masalah ekonomi, masalah pekerjaan, dan masalah sosial. Oleh karena itu, tidur harus dipertimbangkan, karena masalah tidur sangat berkaitan dengan masalah psikologis pada kehamilan yang berdampak pada kesejahteraan ibu hamil dan janin.

Berdasarkan hasil analisis statistic yang telah peneliti lakukan didapatkan hasil bahwa tidak terdapat perbedaan yang signifikan antara kualitas tidur ibu hamil dengan berat badan lahir bayi, hal ini dapat disimpulkan tidak terdapat hubungan yang signifikan kualitas tidur ibu selama hamil dengan berat badan lahir bayi. Pada penelitian ini diperoleh hasil bahwa terdapat hubungan yang signifikan antara kualitas tidur ibu hamil dengan panjang badan bayi baru lahir..Sejalan dengan hasil penelitian Wielgoś et al, (2022) melaporkan bahwa tidak menemukan hubungan kualitas tidur dengan komplikasi keamilan dan kesehatan bayi baru lahir, tidak terdapat hubungan yang signifikan antara kualitas tidur dengan berat badan lahir bayi dan panjang badan

lahir (Wielgoś, Zgliczyńska, Sochacki-Wójcicka, Kosińska-Kaczyńska, & Smyka, 2022). Hasil serupa dilaporkan oleh peneliti lain yang tidak menemukan hubungan. Kualitas tidur yang dinilai oleh PSQI dengan berat lahir neonatal dalam penelitian prospektif (Sharma et al., 2016). Penelitian Liu et al.,(2021) menemukan bahwa tidak ada hubungan kualitas tidur ibu hamil dengan berat badan lahir pada bayi laki-laki, namun berbeda dengan bayi perempuan, dimana skor-z berat badan bayi baru lahir perempuan menurun karena kualitas tidur ibu hamil pada trimester ketiga memburuk. Pada penelitian ini juga diperoleh hasil bahwa terdapat hubungan yang signifikan antara kualitas tidur ibu hamil dengan panjang badan lahir bayi (Liu et al., 2021).

Menurut asumsi peneliti pada penelitian ini tidak terdapat hubungan anatara kualitas tidur dengan berat badan lahir disebabkan karena pada penelitian ini peneliti mengontrol variabel perancu seperti indeks masa tubuh ibu, gula darah ibu, tekanan darah iadaan normal. Ibu hamil tidak merokok dan konsumsi alcohol, sehingga kondisi ini dapat berpengaruh pada berat lahir bayi. Sementara panjang badan lahir bayi ditemukan berhububungan dengan kualitas tidur. Pertumbuhan panjang bayi sesuai dengan perubahan tidur. Penelitian sebelumnya telah memberikan bukti hubungan antara tidur dan pertumbuhan panjang/tinggi badan. Semburan hormon pertumbuhan sekretori diketahui meningkat setelah awitan tidur selama tidur gelombang lambat (NREM), terdapat hubungan linier antara jumlah tidur gelombang lambat dan sekresi GH(Lampl & Johnson, 2011).

Kualitas tidur yang buruk dan durasi tidur yang pendek telah dikaitkan dengan peningkatan keadaan inflamasi yang ditunjukkan oleh peningkatan sitokin inflamasi seperti interleukin-6, tumor necrosis factor alpha dan protein C-reaktif Wanita, khususnya, lebih rentan terhadap peningkatan peradangan sebagai akibat dari gangguan tidur dan kurang tidur. sitokin interleukin 8, proinflamasi (Lee et al., 2020). Ada beberapa mekanisme potensial yang menghubungkan kurang tidur dengan pertumbuhan janin yang tidak diinginkan. Perubahan fisik dan hormonal bertanggung jawab atas dampak kualitas tidur dengan berat badan lahir dan panjang badan lahir.. Tidur yang terganggu dapat mengganggu remodeling vaskular tempat tidur plasenta yang normal pada awal kehamilan. Remodeling yang terganggu ini dapat menumbuhkan lingkungan hipoksia kronis dan memberikan dampak negatif pada pertumbuhan plasenta dan janin. Selain itu, aktivasi sumbu hipotalamus hipofisis-adrenal (HPA) disertai dengan stimulasi kortisol akibat penurunan kualitas tidur. Tingkat kortisol ibu yang lebih tinggi dikaitkan dengan berat badan lahir rendah (Liu et al., 2021).

Pada penelitian ini diketahui bahwa terdapat hubungan yang signifikan antara kualitas tidur ibu hamil dengan nilai APGAR score pada bayi baru lahir.hasil penelitian ini sejalan dengan penelitian di Iran dengan 457 peserta, ibu yang tidur kurang dari 8 jam per hari pada trimester ketiga telah terbukti melahirkan bayi baru lahir dengan skor Apgar lebih rendah dibandingkan dengan ibu yang tidur lebih lama (Zafarghandi et al., 2012). Sejalan dengan penelitian Felder et al (2022) yang melaporkan bahwa Ibu hamil dengan gangguan tidur seperti sleep apnea memiliki bayi yang lebih cenderung memiliki hasil yang merugikan, skor Apgar 1 menit yang rendah, tinggal di NICU, dan kunjungan bayi di ruang gawat darurat di tahun pertama kehidupan (Felder et al., 2022).

Terdapat perbedaan rerata Kadar Brain Derived Neurotopic Factor (BDNF) dengan kuali kuallitas tidur ibu hamil, sehingga dapat disimpulkan terdapat hubungan yang signifkan antara Kualitas tidur ibu hamil dengan kadar Brain Derived Neurotopic Factor (BDNF) darah tali pusat bayi pada ibu bersalin hal ini dapat dilihat dari p value < 0,05 yaitu p= 0,000. Dimana semakin buruk kualitas tidur ibub hamil maka rerata kadar BDNF juga akan semakin rendah. Kadar Brain Derived Neurothopic Factor yang rendah dapat memengaruhi perkembangan otak antara lain menyebabkan atrofi hipokampus. Atrofi hipokampus akan memengaruhi perkembangan sarafa, gangguan kognitif, tingkat kecerdasan anak, dan emosional anak dimasa depan (Scheinost, Spann, McDonough, Peterson, & Monk, 2020).Brain Derived Neurotrhopic Factor (BDNF) merupakan

prediktor yang berkontribusi pada patogenesis keterlambatan perkembangan anak sejak janin (Fung et al., 2015). Gangguan tidur dan depresi dapat berpartisipasi dalam manifestasi aksis HPA yang abnormal dan peningkatan kadar kotisol. Peningkatan kadar kortisol ini dapat menekan produksi kadar BDNF (Bao et al., 2022). Hal ini menunjukkan bahwa ibu hamil dengan kualitas tidur buruk dapat menurunkan kadar BDNF yang berperan penting dalam perkembangan saraf, tingkat kognitif dan emosional bayi dimasa depan.

CONCLUSION

In this study, it is known that the quality of sleep of mothers during pregnancy affects the health of newborns. Pregnant women with poor sleep quality can affect the growth and development of the baby. It is known that there is no relationship between the sleep quality of pregnant women and the baby's birth weight. There is a relationship between the sleep quality of pregnant women and newborn body length. In this study, it is also known that the quality of sleep of pregnant women is related to the development of newborns. Based on the statistical results, it was found that there was a relationship between the sleep quality of pregnant women and the newborn's Apgar score and BDNF levels. This shows that it is important to maintain the quality of a mother's sleep during pregnancy. It is hoped that health workers will not only focus on the physical care of pregnant women but also pay more attention to psychological problems and sleep disturbances in pregnant women.

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