

**Understanding Maternal Attitudes and Practices towards Acetaminophen Use during Pregnancy and its Potential Impact on Children's Sleep and Attention**

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## ABSTRACT

Acetaminophen is widely used during pregnancy since it is thought to be safe for treating pain and fever. However, recent research has highlighted concerns about the long-term implications on prenatal development, particularly neurodevelopmental outcomes in children. This cross-sectional study sought to investigate maternal attitudes and practices about the use of acetaminophen during pregnancy, as well as the potential impact on children's sleep and attentiveness. The study, conducted in Karachi, Pakistan, examined mothers with children aged 1 to 5 years old using a standardized questionnaire that included demographic information, acetaminophen use during pregnancy, maternal and child sleep habits, and attention-related behaviors. The findings found that a large proportion of mothers took acetaminophen throughout pregnancy, mostly for pain reduction and cramp management, with consistent use across trimesters. Furthermore, a significant proportion of women reported a family history or past diagnoses of sleep and attention issues in their children. Despite this, few mothers sought medical advice or explored alternative remedies for these difficulties. Furthermore, the majority were ignorant of acetaminophen's potential link to sleep and attention difficulties in youngsters. These findings highlight the need for greater drug awareness and educated decision-making among pregnant women, as well as the role of healthcare practitioners in guiding and monitoring maternal and child health outcomes. More study is needed to understand the long-term effects of prenatal acetaminophen exposure on children's neurodevelopment and to guide evidence-based mother and child healthcare practices.

## INTRODUCTION

Acetaminophen, also known as paracetamol, is a widely used analgesic and anti-pyretic. It is considered safe for most adults and is often recommended as the first-line treatment for pain and fever during pregnancy. However, recent studies have raised concerns about the potential long-term effects of acetaminophen exposure on the developing fetus (Bauer, Swan et al. 2021).

Acetaminophen is one of the most commonly used medications during pregnancy. Pregnant women experience the same fevers, inflammation and pain during pregnancy that occur outside of pregnancy. Acetaminophen is also safe to take after pregnancy to relieve pain and fever. In fact, it is often recommended to take acetaminophen after childbirth to help with pain from cramping and episiotomies. Acetaminophen has been considered the preferred over-the-counter analgesic for use in pregnancy compared to the alternative non-steroidal anti-inflammatory drugs (NSAIDs) which have been associated with increased risks of select birth defects and premature closure of the ductus arteriosus. It has been previously reported that between 40% and 65% of pregnant women use acetaminophen, with estimates of 3% to 20% of women reporting use in all three trimesters (Bandoli, Palmsten et al. 2020, van den Anker and Allegaert 2020).

It is generally considered safe to take acetaminophen in recommended doses during pregnancy, but there is some evidence that it may be associated with an increased risk of certain neurodevelopmental problems in children, such as attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) (Bertoldi, Rifas-Shiman et al. 2020, Masarwa, Platt et al. 2020).

However, it is crucial to note that the prescribed acetaminophen dosage may vary for breastfeeding women. The recommended dose of acetaminophen for adults is 325-650 mg every 4-6 hours, with a maximum of 4 grams (4,000 milligrams) in 24 hours (Nagi, Reddy et al. 2021). According to studies, acetaminophen is most commonly used in the first trimester of pregnancy and decreases significantly in the second and third trimesters. This is most likely because many women experience morning sickness in the first trimester, and acetaminophen is frequently effective for nausea and vomiting (Paul and Walson 2021, Suda, Cendejas Hernandez et al. 2021). Recent research suggests that prenatal acetaminophen exposure may be connected with an increased risk of neurodevelopmental disorders in children. This research discovered that children who were exposed to acetaminophen in gestation were more inclined to have ADHD, ASD, and other neurodevelopmental issues. However, further study is required to validate these conclusions.

### **Objective of the study:**

This study aimed to examine acetaminophen usage during pregnancy using well-characterized data from the local population of Karachi, Pakistan, from the MotherToBaby Pregnancy Project. The study focuses on determining mothers' knowledge, attitudes, and perspectives on the use of acetaminophen during pregnancy, which may lead to sleep or attention-related disorders in their children after birth.

### **METHODOLOGY:**

#### **Study Design**

This study design employs a cross-sectional research, which involves collecting data from a sample of participants at a single point in time. This design is suitable for exploring the association between acetaminophen use during pregnancy and neurodegeneration and ADHD in children.

#### **Questionnaire Design**

A standardized questionnaire was developed to collect data from participants. The questionnaire includes the following sections:

1. Demographic information: This section gathered information about the mother's age, education level, marital status, socioeconomic status, and occupation.
2. Acetaminophen use during pregnancy: In this section details question regarding brands, doses, and duration of acetaminophen use during each trimester of pregnancy were asked.
3. Maternal sleep cycles: General information regarding mother's sleep patterns, including sleep duration, quality, and disturbances were taken in consideration.

4. Maternal comorbidities: This section investigated any chronic medical conditions or health issues the mother may have.
5. Child's sleep cycle: The information about the child's sleep patterns, including sleep duration, quality, and disturbances were asked from mothers.
6. Child's attention-seeking behavior: This section assessed the child's attention-seeking behavior using standardized questionnaires such as the Conners' Parent Rating Scale (CPRS) (Nguyen, Montout et al. 2023).

### **Study Plan**

1. Participant recruitment: Mothers of children aged 1-5 years were recruited from Karachi, Pakistan, through using social media platform, approaching directly to them, the questioned were asked regarding the study.
2. Data collection: Mothers were invited to participate in the study and were provided with an informed consent form explaining the purpose of the study, the procedures involved, and their rights as participants. Consented mothers were asked to complete the questionnaire.
3. Data analysis: The collected data was analyzed using appropriate statistical methods, and expressed as frequency and percentages.

### **Inclusion Criteria**

1. Mothers of children aged 1-5 years
2. Mothers who have resided in Karachi, Pakistan for at least the past year
3. Mothers who are willing to participate in the study and provide informed consent

### **Exclusion Criteria**

1. Mothers with children diagnosed with a chromosomal abnormality or genetic disorder
2. Mothers with children who have experienced prematurity or birth complications
3. Mothers with children who have a history of neurological or developmental disorders

### **Paper Setting**

The study was conducted in accordance with the ethical guidelines of the Helsinki Declaration.

### **Duration of the Study**

The data collection phase of the study took approximately 6 months.

## RESULTS

Table 1: Sociodemographic feature of Participating mothers

Feature		Frequency	Percentage
Age of Women	18-24	42	14.6
	25-30	111	38.5
	30-35	72	25.0
	35-40	63	21.9
Employment status	Employed	72	25.0
	Unemployed	216	75.0
Educational Status	Matric/O-levels	12	4.2
	Intermediate/A-levels	111	38.5
	Graduate	129	44.8
	Post-Graduate	36	12.5
Financial Status	Lower Middle Class	0	0.0
	Middle Class	255	88.5
	Upper Class	33	11.5
Number of Children	1	57	19.8
	2	108	37.5
	3	72	25.0
	4	51	17.7

Table 2; any Medical or Mental health issue previously have been diagnosed in mothers

Feature		Frequency	Percentage
Mental health Score (from very poor to Excellent)	1 (very poor)	27	9.4
	2 (poor)	87	30.2
	3 (fair)	111	38.5
	4 (good)	57	19.8
	5 (excellent)	6	2.1
Any co-morbidity or any genetic disorder	Arthritis	18	6.3
	Arthritis, Sleep/Attention disorder	18	6.3
	Diabetes	30	10.4
	Hypertension	57	19.8
	Hypertension, Diabetes	6	2.1
	Hypertension, Arthritis, Sleep/Attention disorder	12	4.2
	Hypertension, Kidney/Liver Disorder, Sleep/Attention disorder	6	2.1
	Hypertension, Sleep/Attention disorder	15	5.2
	PCOs	36	12.5
	PCOs, Hypertension, and Sleep/Attention disorder	6	2.1

	Sleep disturbances	66	22.9
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Table 3(a): Usage of Panadol in pregnancy

Feature		Frequency	Percentage
No. Of pregnancy in which acetaminophen was commonly used	1	111	38.5
	more than 1	99	34.4
	Not taken in any	78	27.1

Table 3(b): Usage of Panadol by Pregnant women

Feature		Frequency (n=210)	Percentage
Trimester in which acetaminophen was most used	1 <sup>st</sup>	65.73	31.3
	2 <sup>nd</sup>	78.75	37.5
	3 <sup>rd</sup>	65.73	31.3
Recommendation for use of acetaminophen	On Physician Prescription	153.09	72.9
	Self-Medication	56.91	27.1
Use of particular brand of acetaminophen in pregnancy	Panadol	177.24	84.4
	Tylenol	4.41	2.1
	Calpol	4.41	2.1
	Provas	17.43	8.3
	Others (None)	6.51	3.1

Table 5: Ratio Sleep cycle disturbance and other medical issues identified in children

Feature		Frequency	Percentage
Family history of sleep and attention disorder	Yes	99	34.4
	No	90	31.3
	Maybe	99	34.4
Any other child suffering from sleep and attention disorder	Yes	75	26.0
	No	171	59.4
	Maybe	42	14.6
Any other disease diagnosed in child	attention seeking behavior(attention-seeking behavior)	9	3.1
	Bone disorder	30	10.4
	Diarrhea	24	8.3
	Down Syndrome	6	2.1
	None	216	75.0

Diagnosis of sleep and attention disorder in child	Attention seeking Behaviors	69	24.0
	Sleep cycle (difficulty in getting to sleep)	57	19.8
	Both of the above	42	14.6
	None of the above	120	41.7
No. of children in same family facing same issue	None	21	7.3
	1	225	78.1
	more than 1	42	14.6

Table 6: Attitude of Mothers towards attention and sleep disturbances in Children

Feature		Frequency	Percentage
Physician consultation regarding attention and sleep issues in children	Yes	66	22.9
	No	222	77.1
Following any treatment protocol regarding attention and sleep issues in children	Medication	30	10.4
	Home remedies	72	25.0
	Counseling	30	10.4
	None	156	54.2

Table 7: Knowledge regarding use of Acetaminophen in pregnancy may lead to attention and sleep cycle disturbance in children

Feature		Frequency	Percentage
Frequent use of acetaminophen in which pregnancy	1st Pregnancy	111	38.5
	2nd pregnancy	42	14.6
	3rd pregnancy	15	5.2
	4th pregnancy	12	4.2
	All	30	10.4
	Not taken in any	78	27.1
Knowledge regarding use of acetaminophen in pregnancy with sleep and attention disorder	Yes	54	18.8
	No	234	81.3

## DISCUSSION

Acetaminophen is a widely used medication for pain and fever. It is considered safe for most adults and is often recommended as the first-line treatment for pain and fever during pregnancy. However, recent studies have raised concerns about the potential long-term effects of acetaminophen exposure on the developing fetus. The exact mechanisms by which acetaminophen exposure may lead to neurodevelopmental problems in children are not fully understood. However, several potential mechanisms have been proposed (van den Anker and Allegaert 2020).

Maternal health during pregnancy plays a crucial role in the well-being of both mothers and their children. Acetaminophen, commonly used to manage pain and discomfort during pregnancy, has raised concerns regarding its potential effects on fetal development. Additionally, maternal

attitudes and practices surrounding acetaminophen use and its impact on children's sleep and attention warrant investigation to ensure optimal maternal and child health outcomes (Castro, Gama et al. 2022, Sznajder, Teti et al. 2022).

Our study revealed that a significant proportion of participating mothers (38.5%) belonged to the age range of 25-30 years, with approximately 75% identifying as housewives and 44.8% attaining a graduate-level education. Furthermore, 37.5% of women reported having two children, reflecting the diverse sociodemographic composition of the sample.

Among participating mothers, approximately 38.5% reported fair health status, while 22.9% experienced sleep disturbances, underscoring the prevalence of health concerns among this population.

Our findings indicate that more than 72% of participating mothers utilized acetaminophen during pregnancy, primarily for pain relief and cramp management. Panadol emerged as the most commonly used brand (84%), with 73% of mothers administering acetaminophen based on physician recommendations. Notably, acetaminophen usage was consistent across trimesters.

More than one-third of families reported a family history of sleep or attention disorders, with 26% of participating mothers indicating that their other children experienced sleep and attention issues. A substantial majority (78.1%) reported having at least one child affected by these disorders.

Despite the prevalence of sleep and attention disorders among children, only 22.9% of mothers sought medical consultation for these issues. Most mothers did not consider additional treatment or home remedies to address sleep and attention disturbances in their children.

A significant proportion (81.3%) of participating mothers were unaware of acetaminophen's potential association with sleep and attention disturbances in children. Moreover, approximately 10% of mothers reported consistent acetaminophen use throughout their pregnancies, potentially raising concerns about its impact on children's health outcomes.

The findings of this study have important public health implications. Acetaminophen is a widely used medication, and it is important for mothers to be aware of the potential risks of taking it during pregnancy. Healthcare providers should educate mothers about the risks of acetaminophen use during pregnancy and help them to make informed decisions about their health and the health of their children. Based on the findings of this study and other studies, the following recommendations are made: Pregnant women should talk to their doctor before taking any medication, including acetaminophen, Acetaminophen should be taken in the lowest effective dose for the shortest possible amount of time.



## CONCLUSION

Our study's findings highlight the importance of boosting knowledge and understanding of maternal attitudes and practices regarding acetaminophen usage during pregnancy, as well as the possible consequences for children's sleep and attention. Healthcare practitioners should work with new mothers to provide informed medicine counseling during pregnancy and constantly monitor children's health outcomes to maintain optimum growth patterns. More study is needed to investigate the long-term consequences of prenatal acetaminophen exposure on children's neurodevelopmental outcomes and to help improve evidence-based maternal and child healthcare practices.

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## DECLARATION OF INTEREST:

There is no conflict of interest among authors.

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