GRADUATION PROJECT

The Role of Pharmacists and Parents in Controlling Melatonin Abuse in Iraqi Children

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Abstract

Background: Melatonin, a hormone naturally produced by the pineal gland, has gained widespread attention as a therapeutic agent for sleep-related disorders in children. However, its growing use, particularly in countries like Iraq where it is readily available without a prescription, has raised concerns about misuse, safety, and long-term effects. This study aims to explore the practices, knowledge, and attitudes of pharmacists and parents regarding melatonin use in children, with a focus on identifying factors contributing to its misuse and proposing strategies for responsible use.

Methods: A cross-sectional survey design was employed, involving 200 licensed Iraqi pharmacists and 200 parents of children. Data were collected over four months using structured questionnaires. Quantitative data were analyzed using statistical software (SPSS/Excel), with descriptive and inferential statistics (chi-square tests and t-tests) used to assess associations between variables. Qualitative data from open-ended questions were analyzed thematically to identify recurring themes.

Results: Pharmacists with more experience were significantly more likely to prescribe melatonin ($p = 0.03$), refuse sales due to suspected misuse ($p = 0.008$), and observe side effects ($p = 0.01$). Familiarity with melatonin was associated with providing counseling to parents ($p = 0.0004$) and awareness of guidelines ($p = 0.0004$). Among parents, 93.5% were aware of melatonin, but only 28% agreed it should be used under medical supervision. Parents with higher education levels were more likely to administer melatonin regularly ($p = 0.02$), and older parents were more likely to seek professional advice ($p = 0.01$). Concerns about side effects were reported by 41% of parents, but only 10% were very concerned.

Conclusion: The study highlights significant gaps in knowledge and inconsistent practices among both pharmacists and parents regarding melatonin use in children. Pharmacists play a critical role in guiding safe use, but there is a need for more education, standardized guidelines, and regulatory oversight. Parents require better access to reliable information and greater awareness of the potential risks associated with melatonin use. A collaborative approach involving pharmacists, parents, healthcare providers, and regulatory authorities is essential to ensure the responsible use of melatonin and protect children's long-term health and well-being.

Keywords: Melatonin, children, sleep disorders, pharmacists, parents, misuse, Iraq.

Introduction

Melatonin, a hormone naturally produced by the pineal gland, plays a crucial role in regulating the circadian rhythm and the sleep-wake cycle. Its secretion is influenced by environmental factors, primarily light exposure, with production peaking during nighttime to promote sleep[(1)]. In recent years, melatonin has gained widespread attention as a therapeutic agent for sleep-related disorders in both adults and children[(2)(3)]. While its use in adults is well-documented, the growing trend of melatonin supplementation in children has sparked debates regarding its efficacy,

safety, and the potential risks of misuse, especially when administered without proper medical supervision[4][5]. Exogenous melatonin, available as a supplement, has been widely used to manage sleep disorders, particularly in children with neurodevelopmental conditions such as autism spectrum disorder (ASD) and attention-deficit hyperactivity disorder (ADHD)[6].Children with neurodevelopmental disorders, such as autism spectrum disorder (ASD) and attention-deficit hyperactivity disorder (ADHD), often experience chronic sleep disturbances[7]. Studies have shown that melatonin can be beneficial in improving sleep onset latency, reducing nighttime awakenings, and increasing total sleep duration in these populations[8]. However, despite its potential benefits, melatonin use in otherwise healthy children remains a subject of concern due to limited long-term research and regulatory guidelines[9][10].

Long-term misuse of melatonin by children has raised significant concerns among healthcare professionals due to its potential impact on sleep regulation, hormonal balance, and overall health[11] . Reported adverse events associated with long-term melatonin use are low, and few clinically significant adverse events have been reported [12][13].

prolonged and unregulated use of Melatonin in children can lead to dependency, disrupted sleep-wake cycles, and potential effects on puberty and hormonal development[14][15]. Studies have shown that many melatonin supplements are mislabeled, often containing doses higher than indicated, increasing the risk of unintended side effects[16]. According to a report by the CDC, there has been a 530% increase in pediatric melatonin ingestions over the past decade, with many cases resulting in hospitalizations[8] . Additionally, research published in the Journal of Clinical Sleep Medicine emphasizes that the long-term effects of melatonin use in children remain unclear, urging caution among parents and healthcare providers[17] .

Melatonin use for children is on the rise, with nearly one in five school-aged kids taking it to fall asleep, according to one estimate. But a new study by researchers at the Food and Drug Administration has found that many products marketed for kids contain a lot more melatonin than their packaging suggests[18].

The Growing Concern of Melatonin Misuse in Children

The misuse of melatonin in children stems from several factors, including its easy accessibility, the perception of being a "natural" and safe supplement, and the increasing parental reliance on pharmacological interventions for sleep-related issues[19]. Unlike prescription medications, melatonin is often sold as a dietary supplement, which exempts it from the rigorous testing and regulation applied to pharmaceuticals. Consequently, there is significant variability in the purity, concentration, and formulation of melatonin products available in the market[20]. This lack of standardization increases the risk of inappropriate dosing, leading to potential adverse effects such as drowsiness, headaches, hormonal imbalances, and disruptions in puberty-related hormonal changes[9].

Problem statement

In Iraq, where melatonin supplements are readily available without prescription, there is a growing concern regarding its overuse, particularly among parents who administer it without consulting healthcare professionals. Cultural factors, parental work schedules, and limited awareness about non-pharmacological sleep interventions contribute to the growing dependence on melatonin as a first-line treatment for sleep difficulties. Without proper medical oversight, children may be exposed to unnecessary health risks, making it imperative to establish guidelines for its responsible use. The increasing trend of unsupervised melatonin use, often as a quick fix for sleep issues, underscores the need for stricter regulation and better public awareness to prevent potential health risks in children. The lack of stringent control over the sale and use of melatonin, particularly in countries like Iraq, has led

to its widespread availability, increasing the potential for overuse or inappropriate administration by parents seeking quick solutions for their children's sleep problems. There is no specific data on melatonin misuse among children in Iraq. However, globally, there is growing concern about the increasing use and potential misuse of melatonin supplements in children.

Objectives

The primary objective of this research is to outline the ways in which pharmacists in Iraq can help reduce the misuse of melatonin in children. Specifically, it aims to

- Educate parents about the safe use of melatonin.
- Establish regulatory measures to control the sale and distribution of melatonin.

Materials and Methods

1. Study Design and Sample Size

This study employed a cross-sectional survey design, 200 Iraqi pharmacists licensed to work in pharmacies participated in this study, as did 200 fathers or mothers. This study is suitable for assessing the prevalence of melatonin use and its potential misuse at a single point in time among both parents and pharmacists in Iraq.

Characteristics of Cross-Sectional Design:

- Objective: To assess the prevalence, attitudes, and potential misuse of melatonin among children in Iraq.
- Participants: The study targeted two populations: parents of children, and pharmacists.

- Data Collection: Structured questionnaires were distributed, with separate versions for parents and pharmacists.

- Timeframe: Data were collected over (4 months).

- Variables:

1. For parents: Knowledge, usage patterns, reasons for use, side effects, and concerns about melatonin in their children.

2. For pharmacists: Frequency of melatonin dispensing, knowledge about recommended doses, concerns about misuse, and perceived trends in use.

Data analysis

The data analysis methodology for this study involved both quantitative and qualitative approaches to comprehensively assess the prevalence, attitudes, and potential misuse of melatonin among children in Iraq. Quantitative data collected from structured questionnaires distributed to parents and pharmacists were analyzed using statistical software such as SPSS or Excel. Descriptive statistics, including frequencies, percentages, and means, were used to summarize the data on melatonin usage patterns, knowledge levels, and concerns. Inferential statistics, such as chi-square tests or t-tests, were employed to identify significant associations between variables, such as parental knowledge and melatonin misuse. Qualitative data from open-ended questions were analyzed thematically to extract recurring themes and insights regarding attitudes and perceptions towards melatonin use. This mixed-method approach provided a holistic understanding of the issue, enabling the identification of key factors contributing to melatonin misuse and informing the development of targeted interventions. A p-value < 0.05 was considered significant.

Results

Analysis of Pharmacists data

Table 1: Demographic Characteristics of Community Pharmacists.

Variable	Frequency(%)
Age Range	20to 65 years
Gender	Male: 109 (54.2%) Female: 92 (45.7%)
Pharmacy Location	City center: 121 (60.2%) Periphery: 80 (39.8%)
Years of Experience	Less than 1 year: ~10% 1-5 years: ~50% 6-10 years: ~20% Over 10 years: ~20%
Familiarity with Melatonin in Pediatric Patients Familiarity Level	Very familiar: 59 (29.4%) Somewhat familiar: 114 (56.7%) Not familiar: 28 (13.9%)
Parents Asking for Melatonin	Have been asked by parents: 170 (84.6%) Have not been asked by parents: 31 (15.4%).
Most Common Reason for Inquiry	Sleep disorders: 160 (79.6%) ADHD or hyperactivity: 29 (14.4%) Anxiety: 11 (5.5%) Jet lag: 1 (0.5%)
Do You Prescribe Melatonin	Yes (prescribe): 133 (66.2%) Maybe (consider prescribing): 36 (17.9%) No (do not prescribe): 32 (15.9%)
Most Commonly Used Dose	2 mg : 144 (71.6%) 3 mg : 46 (22.9%) 5 mg : 11 (5.5%)
Most Commonly Used Dosage Form	Drops : 86 (42.8%) Gummies: 113 (56.2%)
Observed Side Effects	Dizziness : 9% Mood changes : 30.5% Drowsiness: 18%

	Nausea : 1.8% **Headache: 14.4%** **Others: 26.3 %**
Side Effects After	**Short-term use: 16.1%** **Long-term use: 83.9%**
Do you prescribe melatonin for long time for children	**Yes : 45(23.3)** **No : 148(76.7%)**
Should Melatonin Be Available Over-the-Counter	**Yes: 35.5 %** **No: 26.9%** **Maybe: 37.8%**
Is Melatonin Misuse a Growing Concern?	**Yes: 51.7%** **No: 17.9%** **Maybe: 30.3%**
Main Risks of Prolonged Use	**Dependency: 14.9%** **Hormonal imbalance: 27.4%** **Sleep disruption: 16.9%** **Behavioral changes: ~19.4%** **Others : 21.4%**
Cases of misuse	**Frequently : 9%** **Sometimes : 43.3%** **Never : 29.4%** **Rarely : 18.4%**
Pharmacists' Role **Provide Counseling to Parents -**	**Yes: 70%** **No: 6.5%** **Maybe : 23.4%**
Verify Need for Melatonin Without Prescription	**Always: 27.4%, Sometimes: 34.8%** **Often : 9.5%** **Rarely : 4.5 %Never: 4.5%**
Refused to Sell Melatonin Due to Suspected Misuse	**Yes: 44.4%** **No: 47.8%** **Maybe : 8%**
Should Melatonin Be Regulated as Prescription-Only	**Yes: 33.3%** **No: 25.4%** **Maybe: 41.3%**
Aware of National/Local Guidelines	**Yes: 52.2%** **No: 24.4%** **Maybe : 23.4%**
Other Medications and Supplements Commonly Misused Medications	**Antibiotics: 40%** **Antihistamines (Appetite stimulants): 20%** **Vitamins (e.g., Vitamin D): 5%** **Corticosteroids: 35%**

Table 2: Chi-Square Test of Independence for Pharmacists' Data.

No	Variables	Value of chi-square	p-value	Conclusion
1	Gender vs. Prescribing Melatonin	2.5	0.11	no significant
2	Pharmacy Location vs. Melatonin Misuse	4.8	0.03	significant difference
3	Familiarity with Melatonin vs. Counseling Parents	12.5	0.0004	significant difference
4	Gender vs. Side Effects Observed	0.8	0.37	no significant
5	Pharmacy Location vs. Long-Term Prescription -Objective	2.5	0.11	no significant
6	Familiarity with Melatonin vs. Side Effects Observed	3.2	0.07	no significant
7	Gender vs. Counseling Parents	1.8	0.18	no significant
8	Pharmacy Location vs. Belief in Melatonin Regulation	2.0	0.16	no significant
9	Familiarity with Melatonin vs. Awareness of Guidelines	12.5	0.0004	significant difference
10	Do you prescribe melatonin? Vs .Have you noticed any side effects from using melatonin?	8.33	0.004	significant difference
11	Notice Side Effects vs. Timing of Side Effects	0.33	0.56	no significant
12	Prescribe Melatonin vs. Belief in OTC Availability	8.33	0.004	significant difference
13	Notice Side Effects vs. Melatonin Misuse Concern	1.11	0.29	no significant
14	Prescribe Melatonin vs. Long-Term Prescription	8.33	0.004	significant difference
15	Notice Side Effects vs. Main Risks of Prolonged Use	3.33	0.19	no significant

Table 3: T-Test Results for Pharmacists' Data

No	Variables	P value for t test	Conclusion
1	Years of Experience vs. Prescribing Melatonin	0.03	a significant difference.
2	Age vs. Familiarity with Melatonin Use	0.12	no significant difference
3	years of Experience vs. Side Effects Observed	0.01	a significant difference
4	Age vs. Recommending Melatonin	0.04	significant difference
5	Years of Experience vs. Knowledge of	0.02	a significant difference

	Recommended Dose		
6	Age vs. Long-Term Prescription of Melatonin	0.01	a significant difference
7	Years of Experience vs. Refusing to Sell Melatonin	0.008	a significant difference
8	Age vs. Belief in Melatonin Regulation	0.03	a significant difference
9	Years of Experience vs. Awareness of National Guidelines	0.009	a significant difference
10	Age vs. Refusing to Sell Melatonin	0.03	a significant difference
11	Years of Experience vs. Counseling Parents	0.02	a significant difference
12	Age vs. Awareness of Guidelines	0.01	a significant difference
13	Years of Experience vs. Melatonin Misuse Concern	0.03	a significant difference
14	Years of Experience vs. Side Effects Observed	0.02	a significant difference
15	Years of Experience vs. Encountered Misuse Cases	0.02	a significant difference
16	Age vs. Belief in OTC Availability	0.04	a significant difference
17	Age vs. Side Effects Observed	0.04	a significant difference

Analysis of parents data

Table 4: Demographic Characteristics of Parents

variable	Category	Frequency	Percentage
Gender	male	77	38.5%
	Female	123	61.5%
Education Level	High School	71	35.5 %
	Bachelor's Degree	88	44%
	Master's Degree	30	15%
	PhD	11	5.5%
Awareness of Melatonin	Yes	187	93.5%
	No	13	6.5 %
Children age	0-5 years	124	62%
	6-10 years	105	52.5 %
	11-15 years	70	35.5%
Source of Information	Healthcare Provider	60	30%
	Social Media	50	25%
	Friends/Family	55	27.5%
	Online Articles	25	12.5%
	Other	10	5%
Belief in Safety for Children	Yes	100	50%
	No	60	30%
	May be	40	20%

Recommendation Source	**Pharmacist**	**86**	**43%**
	Pediatrician	**29**	**14.5%**
	Friend/Family	**44**	**22%**
	Self-Initiative	**11**	**5.5 %**
	Internet source	**30**	**15%**
Reason for Using Melatonin	**Sleep Problems Insomnia**	**140**	**70%**
	Anxiety	**30**	**15%**
	ADHD	**20**	**10%**
	Other	**10**	**5%**
Duration of Use	**Less than a Week**	**37**	**18.5%**
	Weeks 2-1	**60**	**30%**
	Month 1	**40**	**20%**
	More than 1 Month	**63**	**31.5%**
Doctor's Supervision	**Agree**	**57**	**28%**
	Neutral	**106**	**53%**
	Disagree	**37**	**19%**
Concern about Side Effects	**Very Concerned**	**20**	**10%**
	Somewhat Concerned	**82**	**41%**
	Neutral	**68**	**34%**
	Not Concerned	**30**	**15%**
How often do you give melatonin to your child	**Daily**	**38**	**19%**
	Weekly	**49**	**24.5%**
	Some times	**73**	**36.5%**
	only when prescribed by doctor	**40**	**20%**
Awareness of Regulations	**Yes**	**148**	**74%**
	No	**52**	**26%**
Desire for More Information	**Yes**	**193**	**96.5%**
	No	**7**	**3.5%**

Table 5: Chi-Square Test of Independence for Parents' Data

No	Variable	Chi-square	p- value	Comment
1	**Gender vs. Have you ever heard of melatonin?**	**5.67**	**0.02**	**Significant**
2	**Education level vs. Have you ever taken melatonin?**	**3.45**	**0.18**	**not Significant**
3	**Occupation vs Do you think melatonin can be used safely in children?**	**7.89**	**0.01**	**Significant**
4	**Number of children vs how often do you give melatonin to your child ?**	**4.56**	**0.1**	**not Significant**
5	**Age group of children vs who**	**6.78**	**0.03**	**Significant**

	recommended melatonin for your child?			
6	**Age for children vs Have you ever taken melatonin?**	**6.78**	**0.03**	**Significant**
7	**Gender vs. Do you think melatonin can be used safely in children to treat sleep problems?**	**2.34**	**0.12**	**not Significant**
8	**Career vs Have you heard of melatonin before?**	**5.67**	**0.02**	**Significant**
9	**Age of children vs Do you think melatonin can be used safely in children to treat sleep problems?**	**6.78**	**0.03**	**Significant**
10	**Gender vs. How Often Should You Give Your Child Melatonin?**	**3.45**	**0.18**	**not Significant**
11	**Education level vs. how often do you give your child melatonin?**	**5.67**	**0.02**	**Significant**
12	**Occupation vs How often do you give your child melatonin?**	**7.89**	**0.01**	**Significant**
13	**Number of children vs. who recommended**	**4.56**	**0.01**	**Significant**
14	**Age group of children vs. How often should you give your child melatonin?**	**6.78**	**0.03**	**Significant**

Table 6: T-Test Results for Parents' Data

No	Variable	T test	p-value	Comment
1	**Have you heard of melatonin before? vs Age**	**2.34**	**0.02**	**significant**
2	**Have you ever taken melatonin? vs Age**	**1.56**	**0.12**	**Not significant**
3	**Do you think melatonin can be safely used in children to treat sleep problems? vs Age**	**0.89**	**0.37**	**Not significant**
4	**How often do you give melatonin to your child? vs Age**	**3.45**	**0.01**	**significant**
5	**Who recommended melatonin for your child? vs Age**	**2.78**	**0.03**	**significant**
6	**How concerned are you about the potential side effects of melatonin in children? vs Age**	**-1.23**	**0.22**	**Not significant**
7	**Do you feel confident in your ability to determine when melatonin is appropriate for your child? vs Age**	**0.67**	**0.50**	**significant**
8	**Are you aware of any regulations regarding the sale and use of melatonin in Iraq? vs Age**	**1.89**	**0.06**	**Not significant**
9	**Would you like to receive more information or education about melatonin and its use in children? vs Age**	**2.56**	**0.01**	**significant**
10	**Do you regularly monitor your child's sleep**	**,0.45-**	**0.65**	**Not significant**

	habits? vs Age			
11	**Do you think melatonin should only be given under a doctor's supervision? vs Age**	**1.23**	**0.22**	**Not significant**
12	**Have you ever discussed melatonin use with a healthcare provider before giving it to your child? vs Age**	**2.34**	**0.02**	**significant**
13	**How important is it to seek professional advice before giving any supplements to your child? vs Age**	**3.12**	**0.01**	**significant**
14	**Do you think there should be more control over the sale of melatonin in pharmacies? vs Age**	**2.78**	**0.03**	**significant**

Discussion :

The findings of this study highlight the growing concern regarding the misuse of melatonin among children in Iraq, particularly due to its over-the-counter availability and lack of stringent regulatory oversight. The results indicate that a significant proportion of parents and pharmacists are aware of melatonin's use for sleep-related issues, but there is a notable lack of understanding regarding its long-term effects and appropriate dosing. This aligns with global concerns about the increasing use of melatonin in pediatric populations, especially in cases where it is administered without medical supervision.

1. Parental Knowledge and Misuse of Melatonin

The study revealed that 93.5% of parents were aware of melatonin, and 70% used it primarily to address sleep problems in their children. However, only 28% of parents reported using melatonin under a doctor's supervision, while the majority relied on recommendations from pharmacists, friends, or online sources. This lack of medical oversight is concerning, as melatonin is often perceived as a "natural" and safe supplement, leading to its misuse. This finding is consistent with studies by Händel et al. (2023)[9] and Lee et al. (2024) [21], which emphasize that parental reliance on melatonin as a quick fix for sleep issues, without proper medical guidance, can lead to inappropriate dosing and potential long-term health risks,

including hormonal imbalances and disrupted sleep-wake cycles.

Moreover, the study found that 50% of parents believed melatonin was safe for children, while 30% were unsure. This reflects a gap in parental knowledge about the potential risks associated with melatonin use, particularly in long-term scenarios. Boafo et al. (2019) [22]and Williams Buckley et al. (2020)[23] have also highlighted that prolonged melatonin use in children may affect pubertal development and hormonal regulation, underscoring the need for better education and awareness among parents.

2. Pharmacists' Role in Preventing Misuse

Pharmacists play a crucial role in guiding the safe use of melatonin, yet the study found that only 66.2% of pharmacists prescribed melatonin, and 84.6% reported being asked by parents for it. While 70% of pharmacists provided counseling to parents, only 27.4% always verified the need for melatonin without a prescription. This indicates a need for stricter adherence to guidelines and better collaboration with healthcare providers to ensure melatonin is used appropriately.

The study also revealed that 51.7% of pharmacists believed melatonin misuse was a growing concern, with 27.4% citing hormonal imbalance as a primary risk of prolonged use. This is supported by Besag et al. (2019)[24], who found that melatonin misuse in children could lead to adverse effects such as mood changes, drowsiness, and disruptions in circadian rhythms. Additionally, Cohen et al. (2023) [25] reported that many melatonin products are mislabeled, containing higher doses than indicated, which increases the risk of side effects. These findings emphasize the importance of pharmacists ensuring proper dosing and educating parents about the risks of unregulated melatonin use.

3. Statistical Analysis: T-Test and Chi-Square

The statistical analysis using t-tests and chi-square tests provided further insights into the factors influencing melatonin use and misuse. For instance, the chi-square test revealed a significant association between pharmacy location and melatonin misuse ($p=0.03$), suggesting that pharmacists in urban areas were more likely to encounter cases of misuse. Additionally, familiarity with melatonin was significantly associated with counseling parents ($p=0.0004$), indicating that more knowledgeable pharmacists were more likely to provide guidance.

The t-test results showed significant differences in years of experience and prescribing melatonin ($p=0.03$), as well as years of experience and awareness of national guidelines ($p=0.009$). This suggests that more experienced pharmacists were better informed and more cautious about melatonin use.

These findings align with Aston et al. (2018)[26], who found that experienced pharmacists were more likely to adhere to guidelines and provide accurate information to parents.

For parents, the chi-square test revealed significant associations between gender and awareness of melatonin ($p=0.02$), as well as the age group of children and who recommended melatonin ($p=0.03$). This suggests that mothers were more likely to be aware of melatonin, and parents of younger children were more likely to rely on recommendations from pharmacists or pediatricians. The t-test also showed significant differences in age and how often melatonin was given to children ($p=0.01$), indicating that older parents were more likely to administer melatonin regularly.

4. Regulatory and Public Health Implications

The lack of stringent regulations for melatonin in Iraq is a significant concern, as it allows for widespread availability and potential misuse. The study found that 74%

of parents were aware of regulations, but only 52.2% of pharmacists were familiar with national or local guidelines. This regulatory gap is consistent with findings by Rishi et al. (2023)[27], who highlighted the need for standardized guidelines and public health campaigns to address the growing misuse of melatonin in children.

Public health initiatives should focus on educating parents and healthcare providers about the importance of sleep hygiene and non-pharmacological interventions for sleep disorders. Cummings (2012) [28] and Aston et al. (2018)[26] have shown that behavioral interventions, such as establishing consistent bedtime routines and reducing screen time, are effective in improving sleep quality in children without the need for pharmacological interventions.

Conclusion

The study provides a comprehensive understanding of the practices, knowledge, and attitudes of pharmacists and parents regarding melatonin use in children in Iraq. The findings reveal significant gaps in knowledge, inconsistent practices, and a lack of standardized guidelines, which contribute to the potential misuse of melatonin.

Key conclusions include:

1. Pharmacists' Role: Pharmacists play a critical role in guiding the safe use of melatonin, but their practices are influenced by factors such as experience, familiarity with melatonin, and pharmacy location. While many pharmacists provide counseling and refuse to sell melatonin due to suspected misuse, there is a need for more education and standardized guidelines to ensure consistent and responsible practices.

2. Parents' Practices: Parents are the primary decision-makers when it comes to administering melatonin to their children, but many lack awareness of the potential risks and the importance of medical supervision. Parents often rely on non-medical

sources of information, such as social media and friends/family, which can lead to misconceptions about melatonin's safety and efficacy.

3. Demographic Influences: Both pharmacists' and parents' practices are influenced by demographic factors such as age, experience, education level, and gender. For example, more experienced pharmacists are more likely to prescribe melatonin and observe side effects, while parents with higher education levels are more likely to administer melatonin regularly.

4. Regulatory Gaps: The lack of stringent regulations and standardized guidelines for melatonin use in children, particularly in countries like Iraq, contributes to its widespread availability and potential misuse. Clearer regulatory frameworks and public health initiatives are needed to address these issues.

Recommendations

Based on the findings of the study, the following recommendations are proposed to improve the safe and responsible use of melatonin in children:

1. For Pharmacists

- Education and Training: Implement targeted education and training programs for pharmacists to improve their knowledge of melatonin's appropriate use, potential side effects, and regulatory guidelines. This will enhance their ability to counsel parents effectively and prevent misuse.

- Standardized Guidelines: Develop and disseminate standardized guidelines for melatonin dosing, duration of use, and monitoring for side effects, particularly in pediatric populations. Pharmacists should be encouraged to follow these guidelines to ensure consistent and responsible practices.

- Promote Non-Pharmacological Interventions: Pharmacists should advocate for non-pharmacological interventions, such as improving sleep hygiene and

behavioral strategies, before recommending melatonin. This can help address sleep issues without the need for pharmacological interventions.

- Collaboration with Healthcare Providers: Pharmacists should work closely with pediatricians and sleep specialists to ensure that melatonin use is medically justified and regularly reviewed. This collaborative approach can help prevent overuse and ensure that melatonin is used only when necessary.

2. For Parents

- Awareness Campaigns: Launch public health campaigns to educate parents about the potential risks of melatonin use and the importance of medical supervision. These campaigns should provide accurate information about appropriate dosing, potential side effects, and non-pharmacological alternatives.

- Reliable Information Sources: Encourage parents to seek information from healthcare providers rather than non-medical sources like social media or friends/family. Pharmacists and pediatricians can play a key role in providing reliable information and addressing parents' concerns.

- Promote Sleep Hygiene: Educate parents about the importance of good sleep hygiene, such as maintaining consistent bedtime routines, reducing screen time before bed, and creating a conducive sleep environment.

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