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Breaking Myths and Improving Awareness: Insights from a Survey on Menstrual Pain and Health

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Abstract. Menstrual pain or dysmenorrhea is a long-term women's health problem with a high prevalence globally. However, this prevalence and the urgent demands of women to solve dysmenorrhea have always been overlooked, and research intensity in dysmenorrhea or menstruation is limited. Our research used an online survey to collect responses from 357 female participants on their basic menstruation condition, life habits, dysmenorrhea condition, and the ways participants use to relieve dysmenorrhea in detail. By analyzing the data, we found several aspects that correlate with dysmenorrhea or its severity, including age at first menstruation, sleep duration, specific symptoms when suffering from dysmenorrhea, the frequency of dysmenorrhea, and the ways used to manage it. The results also clarify that aspects such as the habits of drinking cold water or staying up late, which are long-term misunderstandings by the public, do not correlate with dysmenorrhea. This can potentially help improve the understanding of dysmenorrhea. The survey additionally collected information on participants' hospital visits for dysmenorrhea, the medicines used to control it, and their attitudes toward new drugs or ways to manage it. This shows the need to persistently strengthen education and put more effort into enhancing the attention and understanding of menstrual health in both the scientific research field and the public, gradually solving the problem of dysmenorrhea.

Keywords: dysmenorrhea, women's health, awareness.

1. Introduction

Menstruation is a routine physiological phenomenon among females. Normal menstruation is defined as the cyclic sloughing of the uterine lining under the control of hormones between menarche and menopause [1,2]. Menstrual health is an essential component of women's health. Currently, a woman is expected to experience more than 400 menstrual cycles in her life [1]. Menstruation also plays a vital role in the continuation of the human species due to the physiological functions of the uterine endometrium in preparing for pregnancy implantation [3]. Dysmenorrhea or menstrual pain is a major manifestation of unhealthy menstruation, featuring a wide range of symptoms such as cramps, headaches, fatigue, backache, sore legs, etc. [4,5]. Dysmenorrhea can be roughly divided into two main types: primary dysmenorrhea (PD) and secondary dysmenorrhea (SD). Primary dysmenorrhea is pain during menstruation in the absence of pathological pelvic disease, while secondary dysmenorrhea is pain caused by pelvic diseases, including endometriosis and adenomyosis, the two most common causes of secondary dysmenorrhea [6,7].

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Dysmenorrhea is highly prevalent among reproductive-age females, with estimates ranging from 45%-93% depending on the definition of dysmenorrhea, regardless of nationality, age, and economic status [6]. However, despite its global prevalence and long-term impact on many women, effective treatments for dysmenorrhea are limited. Common therapies include medical treatments such as Nonsteroidal anti-inflammatory drugs (NSAIDs) and oral contraceptive pills (OCPs), as well as complementary and alternative treatments like topical heat, acupuncture, and exercise. However, except for NSAIDs, other treatments are not as effective or lack sufficient evidence to support their efficacy [8].

The limited advances in inventing more effective management and treatments for dysmenorrhea reveal a lack of sufficient research focus and efforts on women's menstrual health. Menstrual health problems need and deserve more attention due to their prevalence, significant impact on women's health, and long-term neglect and misunderstanding of dysmenorrhea by the public. Myths and rumors about dysmenorrhea persist and are widely spread in everyday conversations. For example, it is commonly said that consuming cold water or cold food leads to dysmenorrhea and should be avoided, and that menstrual blood color correlates with dysmenorrhea. However, our research indicates no correlation between dysmenorrhea and the habit of consuming cold water or cold food or menstrual blood color. This example represents the purpose of our research: to dispel long-standing rumors and misconceptions about menstrual health by providing a credible and scientific perspective through large-scale survey data, thereby improving the understanding of menstruation and the physical experiences of those with dysmenorrhea. With a better understanding of women's menstrual health conditions, research intensity and attention will naturally increase. The social atmosphere toward women's menstruation will become more open and friendly, with more menstrual education and less menstrual stigma, which are essential prerequisites for improving women's menstrual health.

2. Methods

2.1. Study Design and Participants

This study utilized a cross-sectional survey design to collect data on menstrual health and pain management practices among women. The survey was conducted online, targeting a diverse group of women from different backgrounds and age groups. A total of 357 female participants completed the survey.

2.2. Data Collection

Data were collected through an online survey platform. Participants were recruited through social media, email invitations, and word of mouth. The survey was available for a specified period, and participants were assured of confidentiality and anonymity. Informed consent was obtained from all participants before they began the survey.

2.3. Data Analysis

The collected data were analyzed using statistical software. Descriptive statistics were used to summarize the demographic information and basic menstrual conditions of the participants. Chi-square tests were conducted to examine the correlations between menstrual pain severity and various life habits and menstrual symptoms. The distribution of pain relief methods and participants' attitudes towards new treatments were also analyzed and visualized using bar charts and pie charts.

2.4. Ethical Considerations

Participants were informed about the purpose of the study, and their participation was voluntary. They were allowed to withdraw from the study at any time without any consequences. The confidentiality and anonymity of the participants were strictly maintained throughout the study.

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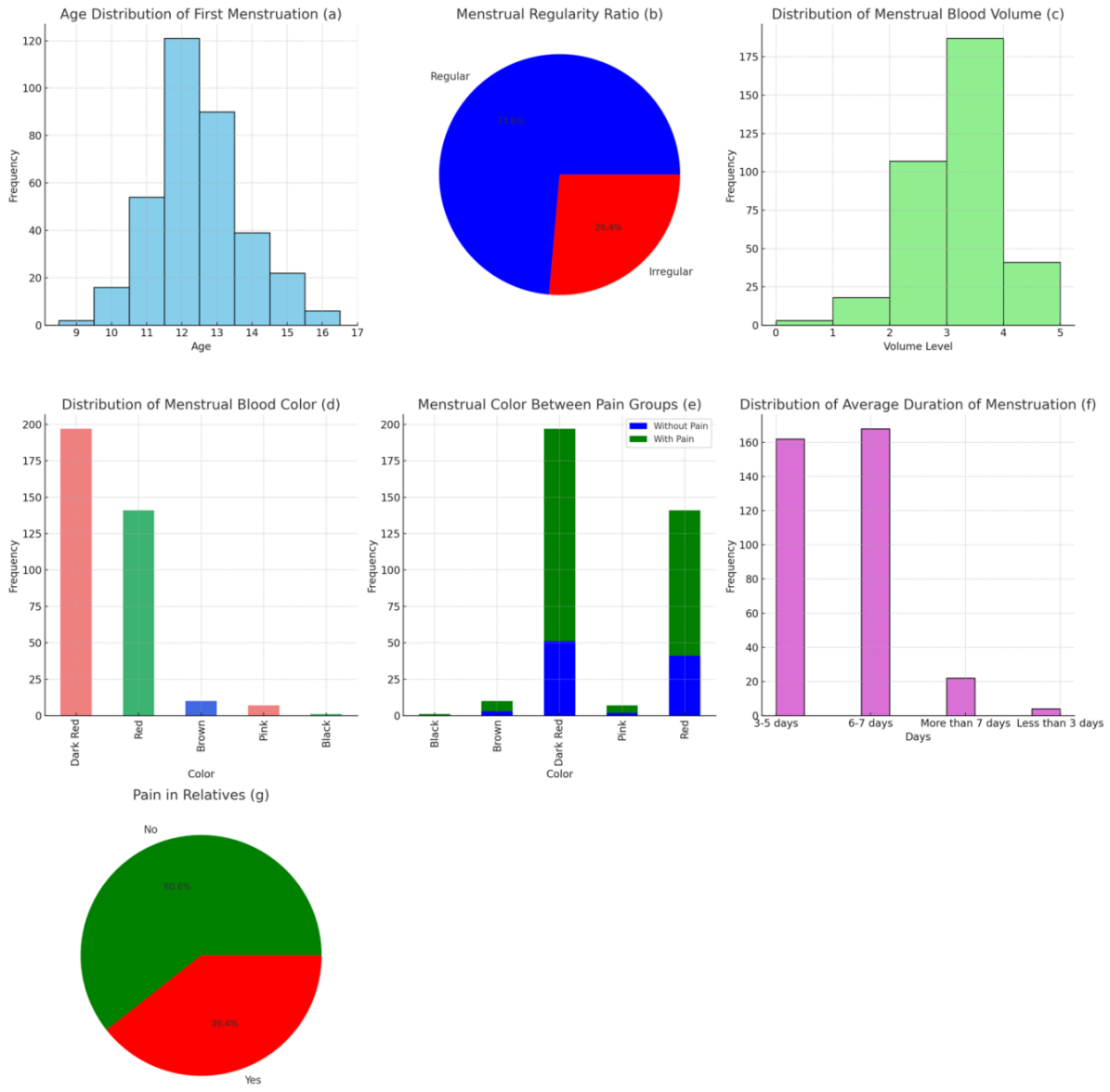

Figure 1. The basic data of the menstruation condition collected in the survey. (a) The age distribution of first menstruation. (b) Menstrual regularity ratio. Red represents irregular menstruation and blue represents regular menstruation. (c) The distribution of menstrual blood volume (based on mid-menstrual condition) is on a scale from 1 to 5. A rating of 1 indicates limited blood volume, such as an amount that is less than the capacity of a single sanitary napkin in one day; a rating of 5 indicates tremendous blood volume, such as an amount that can fill a sanitary napkin completely in just one hour. (d) The distribution of menstrual blood color. (e) The comparison of menstrual color between participants with and without menstrual pain. Green represents participants who experienced menstrual pain and blue represents participants who did not experience menstrual pain. (f) The distribution of the average duration of menstruation. (g) The ratio of participants with menstrual pain having relatives with menstrual pain. Red represents the relatives of those participants with menstrual pain who also experienced menstrual pain and green represents the relatives of those participants with menstrual pain who did not experience menstrual pain.

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3. Results

3.1. Demographics and Basic Menstrual Conditions

The participants' age distribution covers all the age stages, from pre-adulthood to postmenopause. The majority of the participants are under the age of 18, accounting for nearly 50%. All the female participants report that they have had menstruation. Figure 1 illustrates the basic menstrual conditions of the 357 female participants. The age distribution of first menstruation (Panel a) shows that participants experienced menarche between the ages of 9 and 17, with the majority falling within the 11 to 13 age range, accounting for approximately 70%. The menstrual regularity ratio (Panel b) indicates that almost 75% of participants have monthly regular menstruation, while around 25% of participants experience irregular menstruation. Panel c displays the distribution of menstrual blood volume, with most participants reporting a mid-level volume. The data were collected by a self-rating from 1-5 to the menstrual blood volume in the mid-cycle situation. 1 represents limited blood volume, for example, the blood volume is less than the volume full one sanitary napkin in one day; 5 represents tremendous blood volume, for example, the blood volume can full one sanitary napkin in just one hour. The average value is 2.71 in all of the 357 responses and most of the participants have a moderate menstrual blood volume around 2-4. The distribution of menstrual blood color (Panel d) shows the color for most participants in their common menstrual conditions is dark red or red. Panel e compares the menstrual blood color between participants with and without menstrual pain. A chi-square test was conducted to analyze the correlation between the menstrual blood color and the experience of menstrual pain, showing no significant correlation (chi-square statistic: 0.841, p-value: 0.933), which indicates the long-standing rumor that dysmenorrhea related to the menstrual blood color is untenable. Panel f presents the average duration of menstruation, showing that most participants have a menstrual duration between 3 and 7 days. The majority of the participants have experienced menstrual pain, accounting for around 70%, while only about 30% of the participants report they have not experienced menstrual pain. Finally, Panel g shows that 39.4% of participants with menstrual pain have relatives who also experience menstrual pain.

3.2. Correlation Between Menstrual Pain and Life Habits

Figure 2 investigates the correlation between menstrual pain and life habits. Around 80% of participants have the habit of consuming cold foods or drinks, with about 20% of the participants not consuming cold foods or drinks. The heatmap in Panel a visualizes the relationship between the severity of menstrual pain and the habit of consuming cold drinks or foods. The chi-square test shows the correlation between consuming cold foods or drinks and dysmenorrhea condition is very weak and has almost no correlation (chi-square statistic: 5.12, p-value: 0.275). Both the numbers of participants who have the habit of drinking hot water or not are large. Roughly 58% of participants have the habit of drinking hot water, and about 42% of participants do not have the habit of drinking hot water. Panel b examines the habit of drinking hot water and its relationship with menstrual pain severity, and the chi-square test also shows no significant correlation (chi-square statistic: 2.28, p-value: 0.684). These test results indicate that widespread rumors that the habit of consuming cold drinks or foods should be avoided, since consuming cold drinks or foods will cause dysmenorrhea or lead to more severe dysmenorrhea and that drinking hot water can reduce the experience of dysmenorrhea are unreliable. The majority (around 60%) of the participants sleep after 12 a.m. with approximately 40% of the participants sleeping before. A chi-square test was conducted to analyze the correlation between the sleep schedule (whether going to bed before 12 a.m.) and the experience of menstrual pain, showing no statistically significant correlation (chi-square statistic: 0.335, p-value: 0.562). The average sleep duration of the majority of the participants is around 6-8 hours, roughly 70%, with around 23% of the participants sleeping less than 6 hours and 7% of the participants sleeping more than 8 hours. Panel c compares the average sleep duration between participants with and without menstrual pain, and the chi-square test shows a statistically significant correlation between the average sleep duration and the experience of menstrual pain (chi-

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square statistic: 7.248, p-value: 0.027), indicating that those with menstrual pain tend to have shorter sleep durations (less than 8 hours).

3.3. Menstrual Pain Severity and Related Factors

Figure 3 explores the severity of menstrual pain and related menstrual indexes. Panel a illustrates the distribution of menstrual pain severity, with an average score of 2.62 on a scale of 1 to 5, representing the middle-level severity. Panel b shows that only 13.1% of participants have visited a hospital due to menstrual pain, potentially indicating the situation that the menstrual problem is not fully recognized and taken seriously. Panel c displays the number of participants experiencing different symptoms, with lower abdominal pain being the most common. The Chi-square test results for the symptoms experienced by respondents with severe menstrual pain versus those with no, mild, or moderate pain show significant differences for several symptoms (Table 1): lower abdominal pain (p-value: 0.0456), dizziness and headache (p-value < 0.0001), vomiting (p-value < 0.0001), back pain (p-value = 0.0012), decreased sleep quality (p-value = 0.0014), and fatigue and weakness (p-value < 0.0001). There are no significant differences between the groups for other symptoms, such as breast tenderness, acne, and other symptoms.

Table 1. Chi-Square Test Results for Dysmenorrhea Symptoms

Symptoms	Chi-square	p-value
Lower abdominal pain	3.9974050655457405	0.04557037224511448
Dizziness, headache	22.499558231839934	2.101919293403841e-06
Vomiting	17.780073921311185	2.479666221080476e-05
Breast tenderness	0.42543483069486	0.5142375518966318
Back pain	10.427699767775254	0.0012413925688272767
Decreased sleep quality	10.19926821671698	0.001404963951504246
Fatigue and weakness	11.393345093575112	0.0007370768280494091
Ache	2.552384543074552	0.11012792955319824
Other	0.6792891592869444	0.4098316070487569

Statistically significant differences between participants with different menstrual pain severity levels were found in lower abdominal pain, dizziness and headache, vomiting, back pain, decreased sleep quality, and fatigue and weakness, indicating people who experience at least severe pain are significantly more likely to report those previous symptoms.

The heatmap in Panel d visualizes the relationship between menstrual pain severity and frequency, showing a significant correlation (chi-square statistic: 59.09, p-value: 7.02×10^-10). People who experience menstrual pain frequently (every month) are at a higher risk of experiencing more severe menstrual pain compared to those who have menstrual pain less frequently (not experiencing menstrual pain every month). Panel e compares the age at first menstruation between participants with and without menstrual pain, indicating that those who experienced dysmenorrhea tended to have earlier menarche (chi-square statistic: 23.038, p-value: 0.006). Panel f examines the distribution of pain severity by age at first menstruation. The chi-square test analyzes the correlation between the age at first menstruation and the menstrual pain severity, with a p-value of 0.012, suggesting that individuals in the very early starting group (9-11 years) are significantly more likely to experience at least severe pain compared to those in the rest of the group (12-17 years), and thus indicating women with earlier menarche are more likely to experience more severe pain. The chi-square test between menstruation regularity and the experience of menstrual pain suggests no statistical significance, denying the potential association between menstrual pain and irregular menstruation (chi-square statistic: 1.233, p-value: 0.267). We also analyze the correlation between the menstrual period duration and the experience of menstrual pain, and the result of the chi-square test shows no statistically significant correlation (chi-square statistic: 1.474, p-value: 0.688), indicating there is no valid evidence can support the common misunderstanding that

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menstrual period duration is relevant to dysmenorrhea. The result of the z-test shows no significant correlation between the difference in the proportions of relatives experiencing menstrual pain between participants who have and have not experienced menstrual pain and the experience of menstrual pain, with a p-value of 0.098, suggesting that whether participants have experienced menstrual pain is not related to whether their relatives have experienced menstrual pain. This result contradicts our expectation of potential genetic factors in dysmenorrhea. However, the results can be skewed or inaccurate by some confounding factors, such as participants filling out the questionnaire not for immediate relatives but for distant relatives.

3.4. Ways to Relieve Menstrual Pain

Figure 4 presents the methods used by participants to relieve menstrual pain. Panel a shows the distribution of specific pain relief methods, with hot water, hot water bags, and sleeping/resting being the most common. Panel b compares the number of pain relief methods used by participants with severe and non-severe pain, indicating that those with severe pain tend to use more methods. The distribution analysis and Mann-Whitney U test provide strong evidence of this difference in participants with severe pain and non-severe pain. A series of chi-square tests were also conducted to analyze the correlation between the use of each relief method and menstrual pain severity. The results show that the use of medicine is a statistically significant method, with a p-value of 0.033, indicating that participants with severe pain tend to use medicine as their management of dysmenorrhea, but there is no statistically significant correlation between other relief methods and experiencing severe menstrual pain.

3.5. Attitudes Towards New Drugs and Methods for Menstrual Pain Relief

Figure 5 investigates the attitudes of participants toward new medications and methods for menstrual pain relief. Panel a illustrates the expectation levels for new treatments, with most participants expressing high expectations. Panel b shows the willingness to try new treatments, with the majority of participants indicating a moderate to high willingness.

4. Conclusion

Menstrual health, specifically dysmenorrhea, remains a critical yet under-addressed aspect of women's health. Despite its widespread prevalence, affecting a significant proportion of the global female population, there is a persistent lack of research and public awareness surrounding this issue. Our study, which surveyed 357 women, highlights the urgent need to debunk long-standing myths and misconceptions about menstrual pain, such as the belief that consuming cold foods or drinks exacerbates dysmenorrhea. Our findings emphasize the importance of accurate menstrual health education and the need for more effective treatments.

The data collected also underline the insufficient attention given to menstrual health in medical research and public policy, which contributes to the ongoing neglect of this vital issue. The low percentage of women seeking medical help for dysmenorrhea, despite its severity, reflects the pervasive stigma and lack of education surrounding menstrual health in society. Furthermore, the strong desire for new treatments among the survey participants indicates a gap in current medical offerings and highlights the need for innovation in this field.

As public attitudes slowly shift towards a more open discussion of menstrual health, it is crucial that these conversations are supported by comprehensive education and research. Schools, healthcare providers, and policymakers must prioritize menstrual health to ensure that women receive the care and support they need. By addressing the gaps in knowledge and resources, we can work towards reducing the impact of dysmenorrhea and improving the overall well-being of women.

In conclusion, this review has shed light on the pressing need for enhanced menstrual health awareness and research. By continuing to challenge misconceptions and advocate for better education and treatment options, we can foster a more informed and supportive environment for women dealing with dysmenorrhea and other menstrual health issues.

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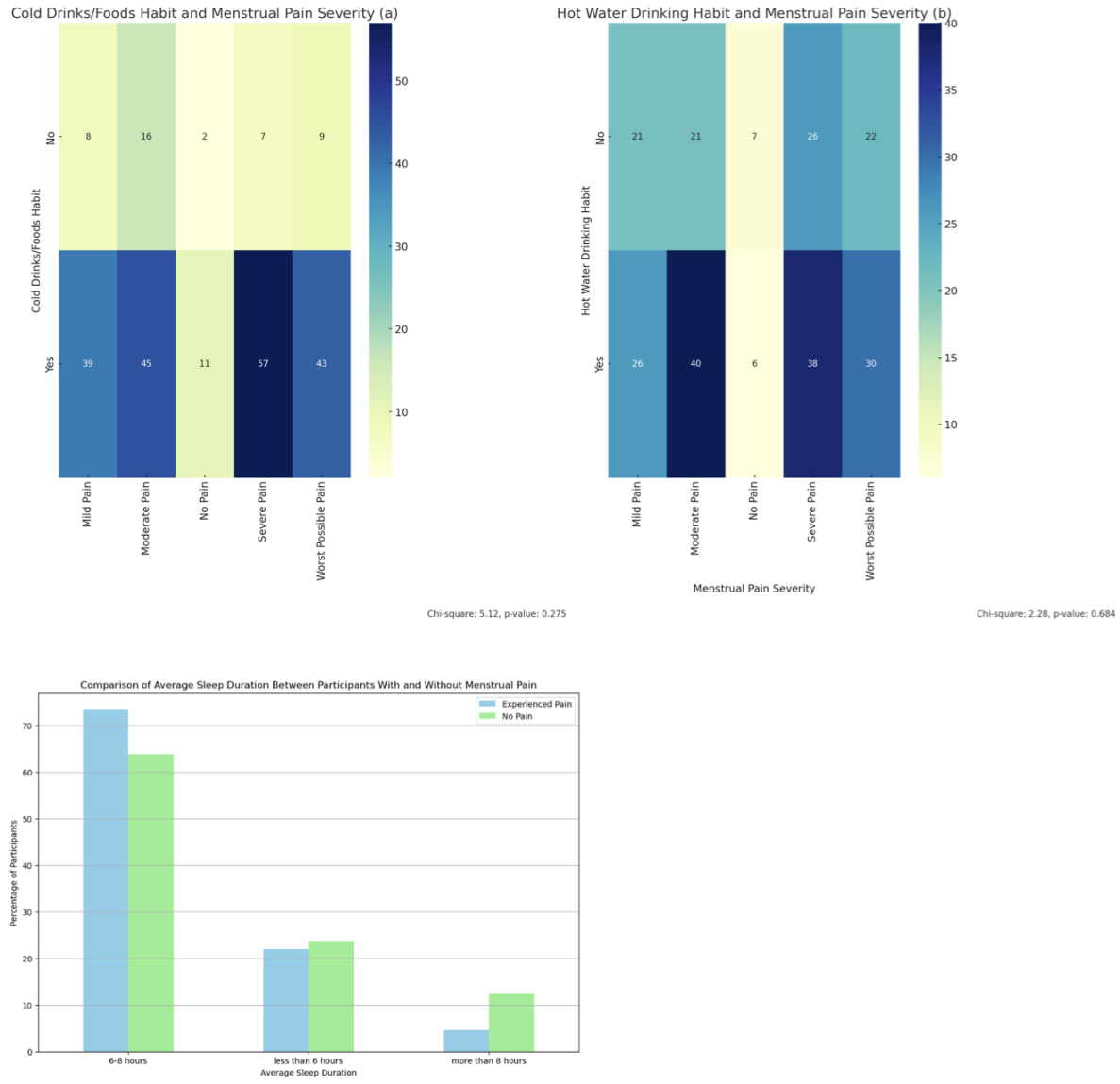

Figure 2. The correlation between menstrual pain and life habits. (a) The heatmap visualizes the contingency table, showing the distribution of menstrual pain severity across those who have a habit of consuming cold drinks/foods and those who do not, chi-square statistic: 5.12, p-value: 0.275. The cell values represent the count of respondents for each combination of habits and severity. (b) The heatmap visualizes the contingency table, showing the distribution of menstrual pain severity across those who have a habit of drinking hot water and those who do not, chi-square statistic: 2.28, p-value: 0.684. Each cell's value represents the count of respondents for that combination of habits and pain severity. (c) The comparison of average sleep duration between participants with menstrual pain and those without menstrual pain. Blue represents participants with menstrual pain and green represents participants without menstrual pain.

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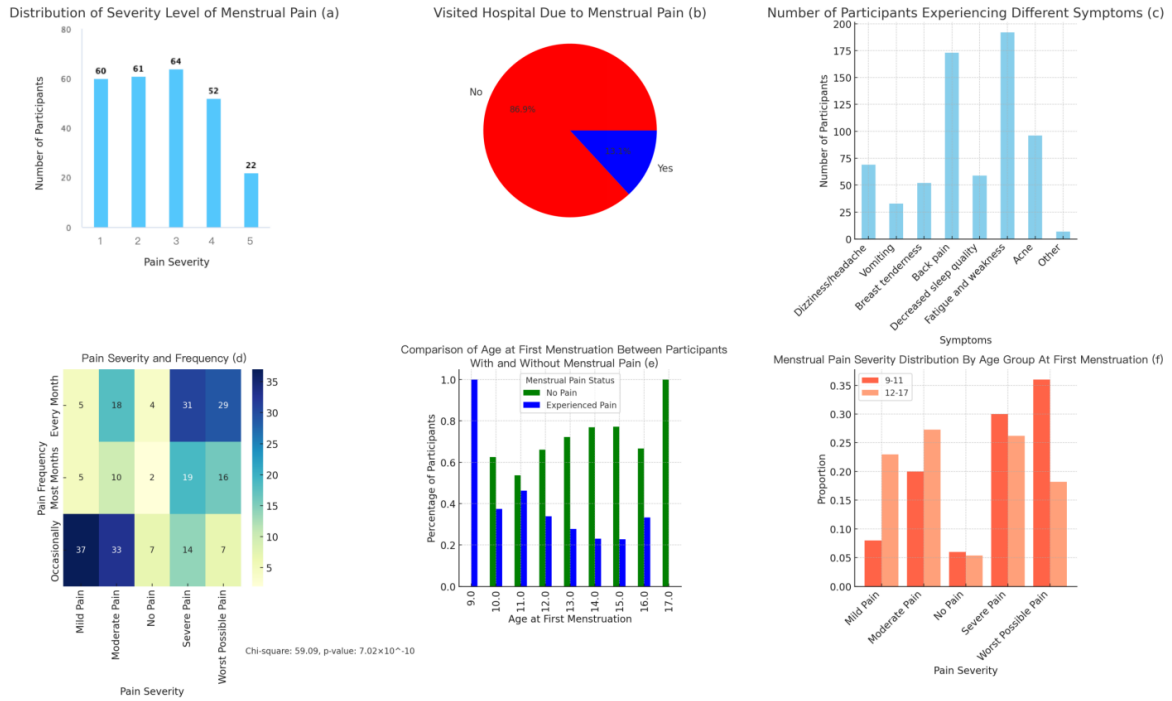

Figure 3. The condition of menstrual pain and related factors. (a) The distribution of severity level of menstrual pain in participants. 1 represents the pain that nearly has no effect on participants' lives, and 5 represents the pain that severely affects participants' lives. (b) The ratio of participants who have visited a hospital due to menstrual pain, blue represents participants who have visited a hospital due to menstrual pain and red represents participants who have not visited a hospital due to menstrual pain; (c) the distribution of specific symptoms of menstrual pain (d) The heatmap visualizes the contingency table showing the relationship between the menstrual pain severity and the menstrual pain frequency, chi-square statistic: 59.09, p-value: 7.02×10^-10. The cell values represent the count of respondents for each combination of frequency and severity. (e) The comparison of age at first menstruation between participants with and without menstrual pain, blue represents participants with menstrual pain and green represents participants without menstrual pain. (f)The menstrual pain severity distribution comparison of age at first menstruation. Dark orange represents the very early starting group (9-11 years) and light orange represents the rest (12-17 years), chi-square statistic: 6.30, p-value: 0.012.

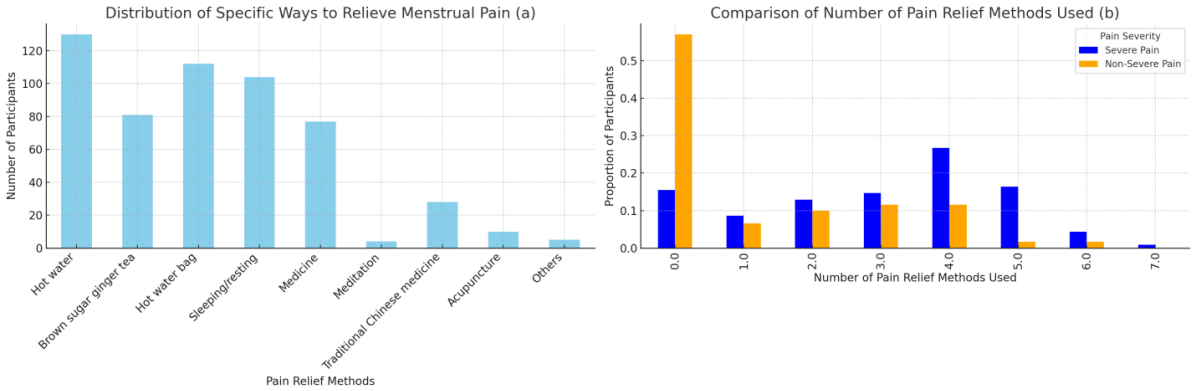

Figure 4. The ways to relieve menstrual pain. (a) The distribution of the specific ways used by participants to relieve menstrual pain. (b) Comparison of the number of pain relief methods used by participants with severe and non-severe pain. Blue represents participants with severe pain and orange represents participants with non-severe pain.

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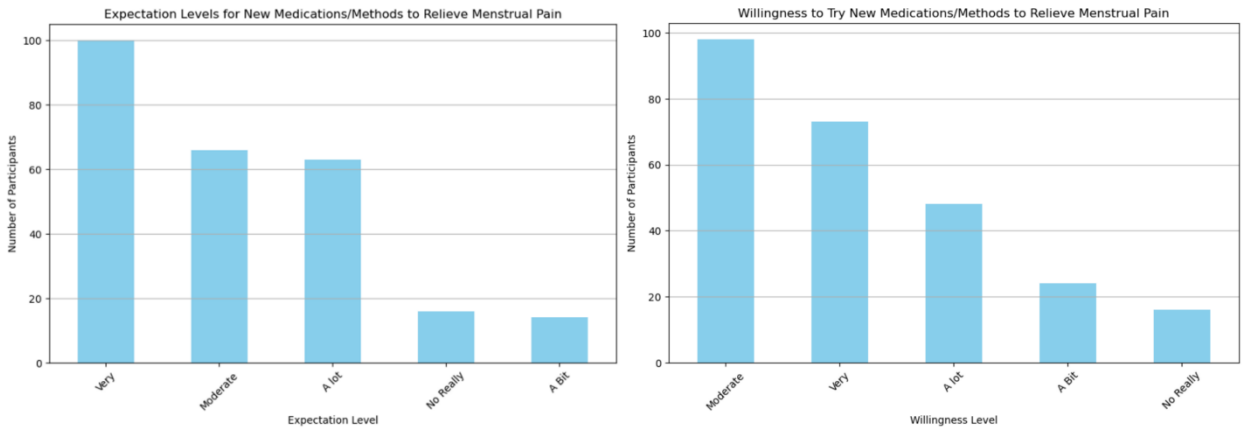

Figure 5. Attitudes of participants towards new drugs. (a) The expectation level for new medications or methods to relieve menstrual pain. (b) The willingness to try new medication or methods to relieve menstrual pain.

5. Discussion

Menstrual health is a serious global issue. However, despite its long-standing presence, this critical aspect of women's health does not receive enough public attention to match its severity. Menstrual pain or dysmenorrhea is a representative aspect of the current menstrual health problems.

Although dysmenorrhea has a widespread and lasting influence on many reproductive-age women, previous research reveals that 45%-93% of women are affected [6]. This is a significant number considering women make up nearly half of the global population. Despite this, the study and exploration of dysmenorrhea mechanisms and solutions for relieving it have been extremely limited. For example, searching for the keyword "COVID-19" from 2019–2024 yields 438,926 results in PubMed, while "dysmenorrhea" has only 9,029 results from 1833–2024. The current research intensity on dysmenorrhea is far from sufficient, especially compared with its prevalence.

By analyzing the survey data, several results contradict public beliefs and common sense. For example, both the habit of consuming cold drinks or foods and drinking hot water are not related to the severity of dysmenorrhea (Figure 2, Panel a & b). Sleeping late does not correlate with dysmenorrhea, but sleep duration does (Figure 2, Panel c). The age at first menstruation is strongly related to dysmenorrhea and its severity (Figure 3, Panel e & f). Correctly understanding menstruation is essential for promoting menstrual health. It is also worth noting that the number of participants who have visited a hospital due to their dysmenorrhea is limited, regardless of the severity level (Figure 2, Panel b). Additionally, of the participants who use medicine to relieve dysmenorrhea, most chose ibuprofen, and none chose contraceptives. These phenomena indicate a deficiency in menstrual education and menstrual care in China.

The survey also collected participants' expectations for new drugs or ways to manage dysmenorrhea and their attitudes toward trying them (Figure 5). The results reveal women's long-term strong desire for novel treatments due to the limited choices of medication, mainly using ibuprofen. This indicates that the emergence of new or alternative drugs is an important task. The long-term lack of attention to menstrual problems and new drugs may also be caused by the absence of female researchers and even laboratory animals in the research environment, leading to an incomplete understanding of women's health problems, not only in dysmenorrhea but also in other major diseases like heart attacks.

The current condition of women's health in scientific research is gradually receiving more attention and developing positively. This is necessarily related to more women entering scientific research, providing insights and experiences from women's perspectives, and allowing more women's health problems to be addressed. Although public attitudes towards discussing menstruation and dysmenorrhea are improving, and menstrual shame is decreasing, education on menstrual health is still insufficient and needs to be strengthened. Women's sense of worthiness should be enhanced. Schools and society should

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educate more women to understand that all uncomfortable symptoms, including dysmenorrhea or irregular menstruation, are not trivial and that they should seek medical help promptly. Governments should put more effort and aid into policy, education, medical insurance, and scientific research to enhance women's menstrual health and reduce the costs of female hygiene products.

Notably, about 120 participants left messages at the end of the survey. They expressed appreciation that our research noticed and addressed menstrual health issues that had been troubling them for a long time. They felt their needs were being recognized and cared for, and the survey helped spread awareness of menstruation. They also shared their feelings, past experiences, attitudes, and prospects about menstruation, dysmenorrhea, and the current state of society regarding female hygiene products and menstrual stigma. They showed strong support for our research and wished for it to succeed and find valuable results. Their voluntary messages and opinion sharing encouraged us, showing the positive changes and improvements in societal attitudes towards menstruation. We were heartened by these additional messages and further recognized the importance of continuously exploring the menstrual health field and raising awareness of the menstrual issues women face.

Sincere thanks to the participants who filled out the survey and shared valuable insights on women's menstrual condition and health.

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