Prevalence and Impact of Primary Dysmenorrhea on Adolescent Girls in India Across Income Levels

Dhaani Singhal[1], Ravi Jasuja[1]
[1]The International School Bangalore, India
[1]Harvard University, USA

ABSTRACT
Dysmenorrhea is a highly prevalent condition among menstruating women, characterized by painful abdominal cramps. The incidence and severity of this disease in developing countries such as India has been understudied, particularly in lower socio-economic levels where healthcare is sought only for acute issues, and menstruation is associated with religious stigma. We hypothesize that dysmenorrhea greatly impacts the lives of these adolescent girls affecting attendance, academic performance and participation in sports and social activities, and that economic status is an important modifier of the extent of this impact. A comprehensive survey was conducted across 2 different groups of adolescent girls attending schools in Bengaluru, a sample of 211 girls from 5 low income schools, and a sample of 58 girls attending international schools. We found a high prevalence and intensity of dysmenorrhoea reported by Indian adolescent girls, with 40-50% of girls in both segments (low and high income) reporting a pain level of 8,9 or 10. 30% of respondents in both income segments were moderately to severely limited in their daily activities by period pain. However, 46% of girls in the low income bracket were affected by religious taboos vs 12% in the high income bracket, and had fewer confidantes and worse access to healthcare. Overall, the results show dysmenorrhoea is a highly disruptive and painful condition causing significant loss of productivity and performance and high levels of social and emotional distress amongst Indian adolescent girls, emphasizing the need for support and teacher education, especially at lower income levels.

Keywords: Dysmenorrhea, Adolescent Girls, India, Menstruation, Religious Taboo

Background

Primary dysmenorrhea is the presence of severe cramping alongside the onset of menstruation in adolescent girls, and may not always be associated with an external cause such as endometriosis. It is found worldwide in women of reproductive age at a prevalence of 16 - 91%, depending on several factors including region, ethnicity, and lifestyle [1]. In adolescents, dysmenorrhea is associated with substantial loss of school days and adversely affecting the quality of life [2]. In India, menstruating women are often excluded from religious events and expected to stay out of temples [3]. Association of such negative sentiment with menstruation is more pervasive in lower income families and households with uneducated parents and therefore the debilitating symptoms of dysmenorrhea are not acknowledged. As a result, these young girls suffer from avoidable fear, anxiety and missed school attendance [4]. In recent years, some non-profit organizations have started to raise awareness towards de-stigmatisation of menstruation in India. However, there is paucity of data from school going girls on the effects of dysmenorrhea on the quality of life of adolescent girls and the potential differences in its impact on girls from high income and low income communities in India. Accordingly, this study examined the impact of dysmenorrhea on the health related quality of life of Indian adolescent girls from high income and low income backgrounds.

We posited that dysmenorrhea is a disruptive occurrence in the lives of many adolescent girls and impacts the quality of life of adolescent school girls. We further hypothesized that economic status is an important modifier of the adverse (non-health related) effects of dysmenorrhea including missed school days, poorer attendance in tests or academic performance and impaired participation in sports events and social activities.

Methods

After seeking appropriate consent of school staff and the students, a comprehensive survey was conducted with 2 different groups of adolescent girls. The first group included a sample of 211 girls from 5 low income schools in Bengaluru (Anjanadri High school, Govt school Kaikondranahalli, Renuka High school Kaikondranahalli, KK English High school Varthur and Dharmasagara High school). The second group was a sample of 168 girls attending international schools in Bengaluru (TISB, Greenwood High, Indus International and Inventure academy), of whom 58 responded and were included in the survey.

3 survey devices were used for the study and administered to both groups of respondents::

- Demographic and menstrual characteristics questionnaire - to capture basic demographic information, menstrual characteristics and any impact on missed school days, exams, sports, cultural and social activities, remedies and restrictions imposed on them. The basis for this questionnaire is a 19 item questionnaire developed for a 2018 Hong Kong study of 653 Chinese adolescent girls [5]. This questionnaire was adjusted/modified suitably and 6 questions related to the impact of dysmenorrhoea were added.
- The Pain Visual Analogue Scale (PVAS) was used to assess the intensity of the dysmenorrhea pain experienced in the last 3 months
- The Health related Quality of life survey validated for use in India [6].

Statistical analysis was performed between representative groups using unpaired T tests or chi squared tests for numerical and categorical variables respectively, with a significance level of 0.05.

Results

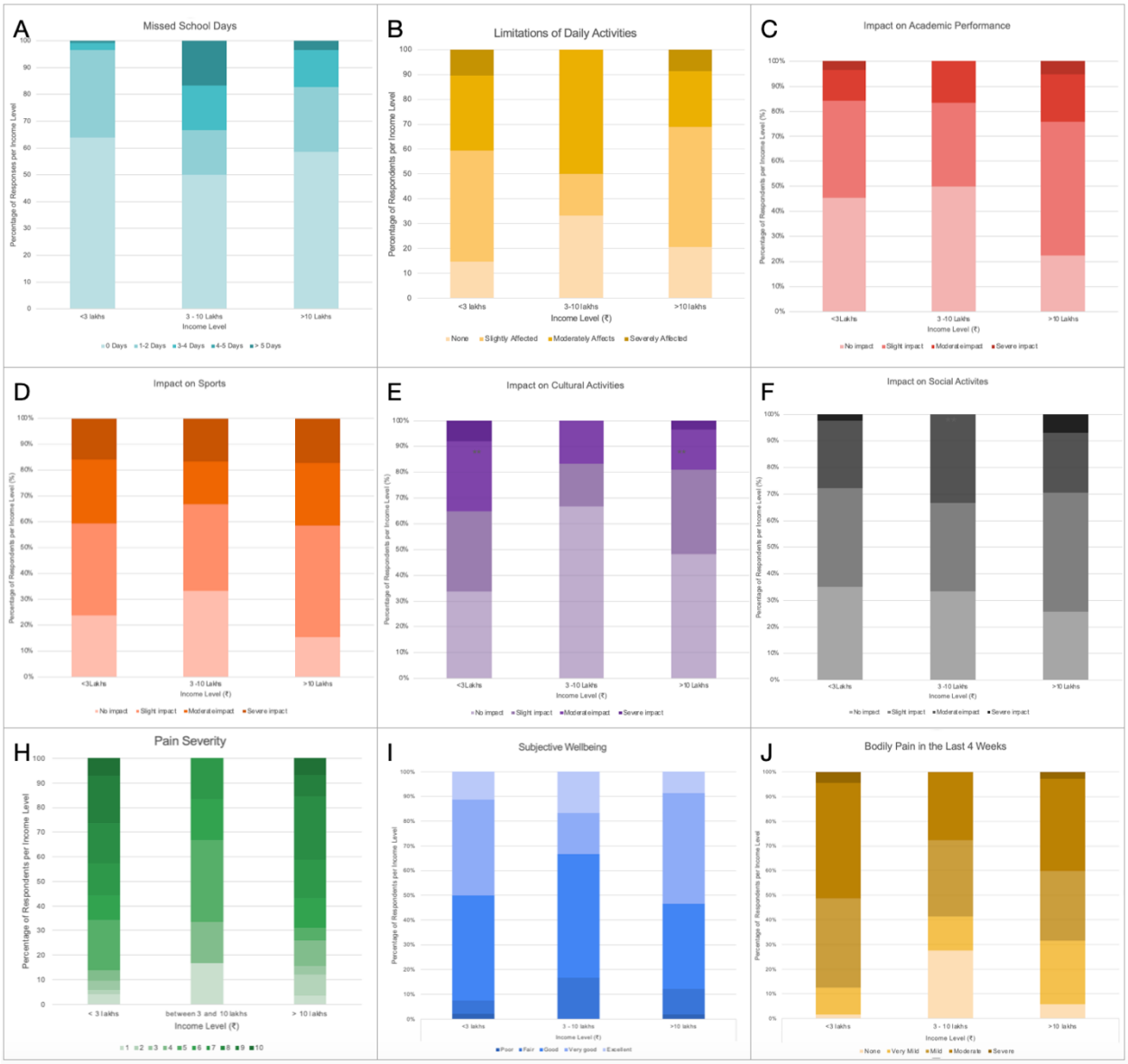
Table 1 shows the average menstrual characteristics of the respondents corresponding to each sample demographic. There was no significant difference in length of menstruation or age of onset of menarche across income brackets.

Table 1: Characterization of Menstrual Characteristics in the Sample Demographics

Income Class (₹/year)	Sample Size	Average Menstrual Cycle (days)	Average Length of Menstruation (Days)	Average Height (cm)	Average Weight (cm)	Average Age of Onset of Menarche (years)	Average Age (Years)	Average Pain Intensity (1 - 10)
< 3 Lakhs	205	24.11 ± 2.92 *	4.39 ± 1.04	148.28 ± 12.90*	40.43 ± 8.14*	12.63 ± 0.87	14.70 ± 1.10*	6.64 ± 2.29
3 - 10 Lakhs	6	28.67 ± 7.66	5.00 ± 1.10	148.50 ± 16.01	48.20 ± 11.69	11.86 ± 0.63	15.00 ± 0.10	4.67 ± 2.07
>10 Lakhs	58	28.98 ± 5.55 *	5.05 ± 0.74	162.80 ± 7.10*	51.27 ± 8.33*	12.12 ± 0.92	16.07 ± 0.97*	6.26 ± 2.47

The length of the average respondent's menstrual cycle was significantly higher in the high income bracket, with a two-tailed p value < 0.0001. This correlates with the observed higher average height, weight, and age seen in the higher income bracket, as higher BMI and age have been shown to be related to increased length of menstrual cycle [7]. Additionally, respondents from all income brackets reported headaches, diarrhoea, anxiety, skin problems, fatigue, breast tenderness, and swelling of lower limbs as other discomforts faced during their menstrual period, with the most common complaint across groups being headaches (163 responses). Notably, a higher percentage of total respondents from the higher income group reported additional ailments in every discomfort surveyed. The most common areas of pain reported were lower abdomen (189 responses), followed by lumbar region (106 responses), pelvic region (36 responses), and upper abdomen (29 responses).

Figure 1: Impact of Dysmenorrhea on Quality of Life



(All figures show percentage of respondents per income level, with darker colors corresponding to increased severity or higher impact unless otherwise specified. Asterisks correspond to significance level, with one asterisk showing significance, and two asterisks showing high significance)

Figure 1 shows the relative percentages of respondents per income bracket and their respective experiences with dysmenorrhea. There is a high prevalence and intensity of dysmenorrhoea reported by Indian adolescent girls. 40-50% of girls in both low and high income brackets report a high pain level during menstruation of 8,9 or 10 on a scale of 1-10 from lowest to most severe pain (Fig. 1H), with an average across all participants of 6.58 ± 2.34. 83% of all respondents across income classes reported a pain intensity of 5 or higher. A third of the participants in both low and high income segments are moderately to severely affected by period pain in terms of the limitation of daily activities (Fig. 1B). 40-50% of girls in both segments report a moderate to severe impact of period pain on sports (Fig. 1D). Similarly, roughly 52% of both income groups report very good to excellent health over the past year. In the four weeks preceding the survey, a greater percentage of lower income girls report mild to severe pain (Fig. 1J), and a higher impact on cultural activities. However, higher income girls take more leave from school every month (Fig. 1A) and state a bigger impact on exam performance and social activities as compared to low income girls (Figs. 1C & F).

Figure 2: Support and Healthcare Received

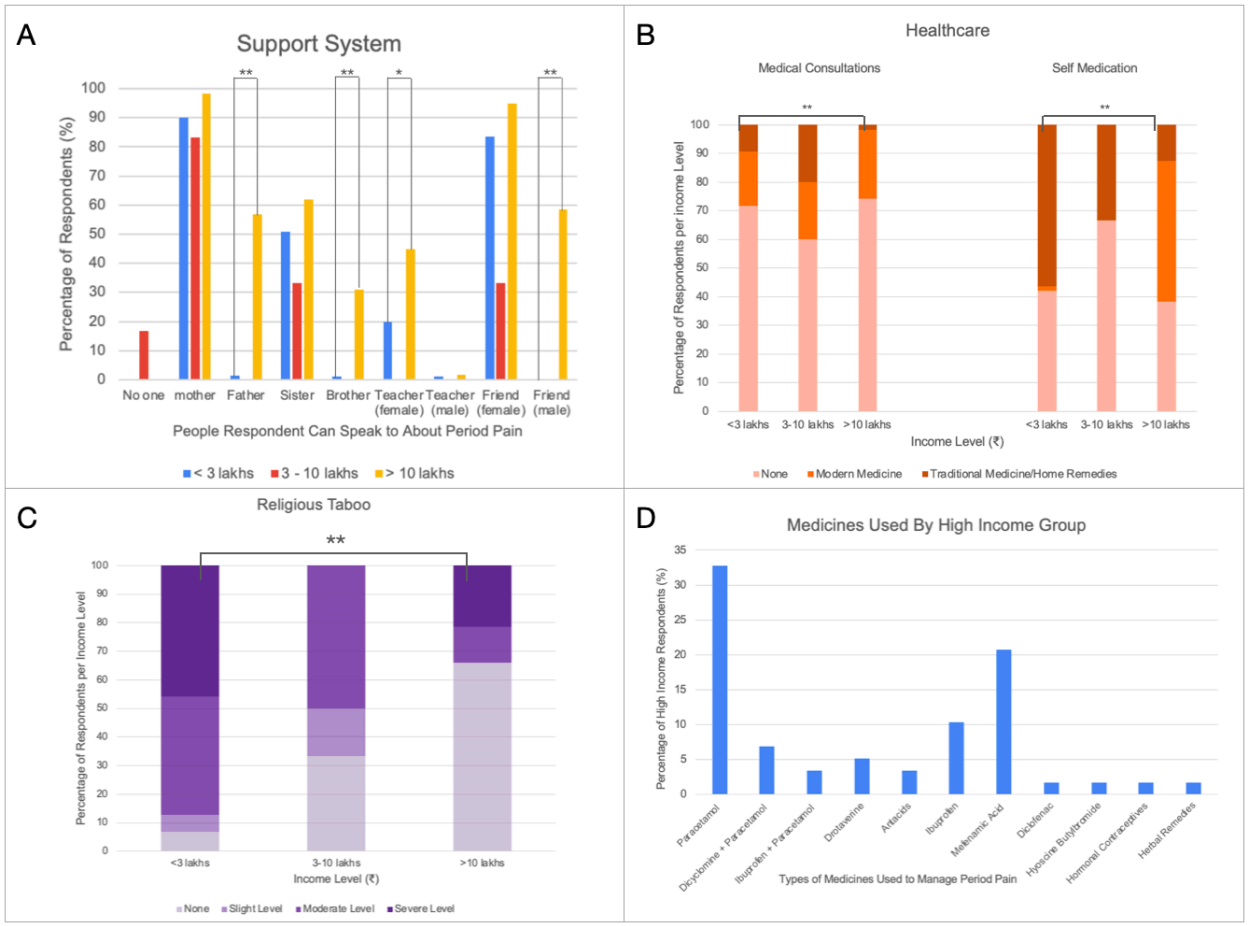


Figure 2 illustrates the support network, healthcare, and taboos received by respondents during their period. In terms of people they can talk to about their period pain, the low income girls are limited to the females in their family and female friends while high income girls appear to be able to talk to both genders in their family, school, and friends, although they still show a preference for female members(Fig. 2A). The most common confidante is the mother (244 responses), followed by a female friend (228 respondents). This is especially observed in the disparity between high income and low income respondents in speaking to male friends, where zero low income respondents felt comfortable speaking to male friends, while nearly 59% of high income girls did. A similar trend is observed with regards to fathers, however, few respondents from each group feel comfortable speaking to male teachers. Moreover, 46% of girls in the low income bracket are affected by severe religious taboos surrounding periods as compared to only 12% in the high income bracket (Fig. 2C). Correspondingly, only 7% of lower income girls have faced no religious taboo, while 66% of higher income girls have faced no religious taboo, a difference that is highly significant. Lower income respondents also receive less care from modern medical practitioners and more from traditional medical practitioners. This trend reflects, with high statistical significance, in medications used for managing symptoms, with only two respondents from the low income group (<1%) using modern medication, as compared to 48.8% of high income girls, with a two tailed p value of < 0.0001. However, all groups had a high percentage of respondents (>70%) that have not visited any medical practitioners, allopathic or otherwise. The most common medicines used by girls in the high income group were paracetamol, under the brand names of Dolo or Tylenol, Ibuprofen, under Advil or Brufen, and tranexamic acid, commonly sold as Pause MF or Meftal, which are NSAIDs and haemostatics, respectively..

Discussion

There is a lack of current research and census data surrounding menstrual characteristics and dysmenorrhea in India, especially stratified by income. Previous research has shown the prevalence of dysmenorrhea in India to be 84.2% (Kural et al., 2015) [8], which correlates with our findings (83% of respondents). Other studies have also shown high prevalence, such as 67.2% (Sharma et al., 2008)[4]. Differences in prevalence reported may be a result of differing ages in experimental samples, as the first study had an average age of 20, while the second had an average age of 14. Additionally, differences in methodology and classification of dysmenorrhea may play a role, as if a pain intensity level of 6 rather than 5 is taken as a baseline, our prevalence becomes 63%, similar to that of the second study. Regardless, the high prevalence of dysmenorrhea emphasizes the need for better menstrual education in lower income schools, starting with the teachers and parents as religious taboos and social stigmas are perpetrated by the support figures of these adolescents.

Although both income brackets reported similar average pain intensity scores, there were differences in the impact of this pain on quality of life. Across both income groups, over 50% of respondents stated moderate or more impacts or limitations across activities tested, supported by the findings of Khumbar et al.(2011) in urban and rural girls in India [9]. This study explored absenteeism and quality of life, finding 48% of dysmenorrhic girls missing school due to illness as compared to 20% in the healthy group. Our results showed 35 - 40% of girls missed at least 3 days of school due to cramping in the month prior to the survey. However, a higher percentage of girls in the higher income group missed 5 or more days of school, as well as a higher impact on academic performances, sports, and social activities. In contrast, a higher percentage of lower income girls reported severe to moderate bodily pain and a worse opinion of their own health. This is supported by studies such as Reyes-Garcia et al., 2016, which illustrated covariance between increasing income levels and subjective wellbeing [10]. Dorner et al.(2011), showed that socioeconomic status is correlated with pain intensity felt and perception of disability due to the pain [11]. Together, the findings of these studies may suggest that although the pain intensities reported by both income levels were similar, the symptoms affecting the high income girls may have been more severe, thus explaining the apparent higher impact the pain has on their academic performance and other activities. Another potential explanation for this phenomenon is that as their baseline subjective wellbeing is lower than those of the higher income group, the difference between the pain felt during dysmenorrhea and their healthy baseline is lower, thus affording them a measure of resilience to the same level of pain that the higher income group lacks. Lastly, Sharma et al.(2019), showed a weak negative association between income level and physical function despite pain, potentially due to the idea that members of lower income classes may be forced to keep physically active despite pain, which may play a role in explaining the discrepancy between the impact of dysmenorrhea on low and high income adolescents [12]. This is also supported by evidence that endorphins produced by physical activity and exercise limit cramping (Abbaspour et al., 2006)[13]. Further research is required to confirm the rationale behind the apparent resilience to menstrual pain demonstrated by adolescents of low income backgrounds.

A higher percentage of lower income girls reported moderate to severe impacts of pain on cultural activities as compared to higher income respondents. This may be explained by differences in physical obligations and of cultural activities common to lower income brackets in India. Additionally, taboos surrounding menstruation are prevalent in India, and may affect participation of menstruating women in cultural and religious practices (van Eijk et al, 2016)[14]. This is supported by the distribution of respondents who suffer religious taboos, with 93% of lower income girls facing some form of religious stigma. These taboos may further affect the support and quality of healthcare afforded to these girls, explaining the lower percentages of low income adolescents who feel able to speak about their menstrual issues with male friends, family, and teachers [15]. Moreover, although higher income respondents demonstrated a more robust support network, over 70% of both high and low income respondents have not visited a healthcare practitioner for aid for their dysmenorrhea, which may speak to a more insidious or non-religious stigma against menstrual care that pervades Indian society [15]. However, higher income girls displayed greater use of self-medication, mostly in the form of non-steroidal analgesic drugs (NSAIDs), which, along with the higher percentage of visitors to modern

medical practices, may be a result of accessibility and affordability [16]. Given both groups demonstrated similar levels of self medication, and the likely lower levels of efficacy of the traditional/home remedies relied upon by the lower income group, these findings may support the apparent greater 'resilience' of the lower income adolescents suffering from dysmenorrhea.

Overall, this study demonstrated clear differences in the impact of dysmenorrhea on, treatment, and support of adolescents from different income brackets, despite similar prevalence.

Conclusions

Findings point to a high prevalence and intensity of dysmenorrhoea amongst Indian adolescent girls in both low and high income groups. Dysmenorrhoea adversely impacts their quality of life, exams and school attendance as well as social, cultural and sports activities. Girls in the high income group likely have better support from male and female members amongst friends, teachers and parents.

Interestingly, the girls from the lower income group exhibited less impacts of the same level of pain intensities suffered even though they faced disproportionately greater religious and social stigma. Even though the girls from the lower income group had limited support in talking to adults, it neither resulted in a greater time off from school nor a high attribution to poorer academic performance. Collectively these data show dysmenorrhoea is a highly disruptive and painful condition with a significant loss of productivity and performance and high levels of social and emotional distress amongst Indian adolescent girls. Despite restrictive religious taboos and minimal support, low income Indian girls may exhibit higher resilience in coping with it. With increase in income and education level of families, there are less taboos and more support available to girls to cope with this suffering.

Further research should be conducted with a larger sample size, potentially across multiple regions in India. Although all the subjects surveyed were of Indian origin, there is still a large amount of genetic variance between regions that may affect the risk factors and prevalence of dysmenorrhea in representative populations. We only received 6 responders from a mid-range income class (an annual income of ₹3 - 10 lakhs), and were thus unable to make statistically representative inferences on this population. From the data we did receive, their responses did not adhere to observed trends from the high or the low income classes, and thus mandates continued exploration. Moreover, Indian society contains a large range of income classes, with 16.4% of the population living below the poverty line **(CITE).** As a result, the respondents from the low income bracket come from a wide variety of backgrounds, and are not necessarily as 'low income' as others may be, many of whom may not even attend schools. Furthermore, our sample size did not include adolescents from rural areas, who due to their different lifestyles and backgrounds, may have different responses as compared to those from urban areas. Lastly, the 'resilience' to pain in lower income brackets observed in this study requires further research, and should be taken into consideration for studies that require self-reporting of symptoms and circumstances .

Conflicts of Interest

The authors of this study have no conflicts of interest to report.

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