

## Assessment of the efficacy of biodegradable sanitary pads: a cross-sectional survey study among college students and staff at South Goa

Anura Bale<sup>1</sup>, Geeta Patki<sup>2</sup>, Madhuri Lotlikar<sup>2\*</sup>, Gandhali Upadhye<sup>3</sup>

<sup>1</sup>B. S. P.'s Gomantak Ayurved, Mahavidyalaya and Research Centre, Shiroda, Goa, India

<sup>2</sup>Department of Prasuti Tantra evum Stree Roga, B. S. P.'s Gomantak Ayurved Mahavidyalaya and Research Centre, Shiroda, Goa, India

<sup>3</sup>Department of Prasuti Tantra evum Stree Roga, B. S. P.'s Gomantak Ayurved Mahavidyalaya and Research Centre, Shiroda, Goa, India

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**\*Correspondence:**

Dr. Madhuri Lotlikar,

E-mail: madhuripednekar9@gmail.com

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### ABSTRACT

**Background:** Menstruation is an absolute physiological event. Menstrual management program is a wide concept worldwide. Many aids are presently available in the market too. Each one has its own positive and negative impacts. Biodegradable sanitary napkins have sparked interest in theo-thinkers as well as users. However, limited research exists on the effectiveness of biodegradable sanitary napkins. Understanding this purview, a study was conducted with the aim to evaluate the effectiveness of biodegradable sanitary napkins among the youngsters.

**Methods:** A cross-sectional survey was conducted among 150 female college students, along with staff from the reproductive phase, who were willing to participate. Participants provided feedback on their experiences with biodegradable sanitary napkins. Females who were known cases of genital infections were excluded from the study. After verbal consent subjects were enrolled in the study. Collection of data was done through Google forms with consent.

**Results:** The study concluded that 68.7% females managed their menstrual flow with these sanitary pads and also indicated that the use of sanitary pads 94.7% subjects did not experience any allergy.

**Conclusions:** The findings of this survey of biodegradable sanitary pads revealed overall satisfaction and minimal side effects. The study also indicated a need for product innovation in comfort, skin safety, and flow management.

**Keywords:** Biodegradable sanitary napkins, Menstruation, Menstrual hygiene, Menstrual product survey

### INTRODUCTION

Menstrual hygiene management is a vital concern for women's health. With the choice of sanitary products playing a crucial role in determining the quality of life for millions of women worldwide. Management of hygiene associated with the menstrual process is referred to as Menstrual hygiene management.<sup>1</sup> The World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) has given special attention on Menstrual Hygiene Management (MHM).<sup>2-4</sup>

In a developing country like India, access to affordable, effective, quality and health-supportive menstrual hygiene products remain a challenge. It is observed that 76.15% of Indian women use hygienic period products, but only 29.6% women adhered to satisfactory menstrual hygiene practices.<sup>5,6</sup>

Failing to properly handle menstrual hygiene can lead to significant impacts on an individual's physical, mental, and emotional well-being, along with their social growth and academic success.<sup>3</sup> In order to manage menstruation

effectively and hygienically, girls and women need access to information about the menstrual cycle and how to manage it.<sup>7</sup> Access to hygienic sanitary products (such as commercial sanitary pads) significantly alleviates discomfort, anxieties, and the associated stigma, ridicule, and embarrassment that prevent women and girls from participating in school or work.<sup>8,9</sup>

Conventional sanitary pads often contain synthetic materials, including plastic-like substances such as polyethylene and polypropylene, which are used for their absorbent layers, backing, and to make the pads thin and flexible. When these plastics are exposed to heat, moisture, or friction, they may release fumes or VOCs (volatile organic compounds), which can include: phthalates; bisphenol A (BPA), styrene, other plastic fumes (if heated).<sup>10,11</sup>

While plastic fumes may not pose a significant risk in the small quantities released from sanitary pads, prolonged exposure to high concentrations of certain plastic-related chemicals (like phthalates or BPA) has been linked to hormonal disruption, skin irritation, and other health concerns. Most health authorities believe that the small amounts of chemicals used in sanitary pads are safe for typical usage, but repeated exposure to some of these chemicals over time may cause potential risks.

Along with this, pads pose significant environmental concerns due to their non-biodegradable materials such as plastic and super absorbent polymers, which contribute to landfill waste and various types of pollution.

In the present era, there is a growing demand for eco-friendly alternatives to traditional sanitary pads. Biodegradable sanitary pads, made from natural materials such as cotton, bamboo and plant-based absorbents, offer a sustainable solution to this problem. These products not only reduce environmental harm but also provide a healthier and more comfortable option for women. As a result, overseeing menstrual health and hygiene for adolescent girls is a significant public health issue for decision-makers in low- and middle-income nations, such as India.<sup>4,12</sup>

While finding the solution, a survey study was conducted at the institutional level to explore the benefits of biodegradable sanitary pads with the aim of evaluating the absorption capacity of natural biodegradable sanitary napkins.

Objectives of the study were to identify the drawbacks of Biodegradable sanitary pads and to gather suggestions for improving the design, functionality of biodegradable sanitary pads.

## METHODS

An open labelled, observational cross-sectional study was conducted at B. S. P.'s Gomantak Ayurved Mahavidyalaya

and Research Centre, Shiroda, Goa for span of 3 to 4 months from August 2024 to December 2024. Inclusion criteria for the study were females in reproductive age group and willing to participate in the study. Females who were known cases of genital infections were excluded from the study. After verbal consent subjects were enrolled in the study. The female faculty, students, and college staff of Ayurvedic Medical College were enrolled in the study. Biodegradable sanitary napkins were supplied by the XX agency. Data collection was done through Google forms with consent, and analysis was done. A study was conducted as per ICMR guidelines.

Population/sample size of the study was 150.

## RESULTS

In the present single-observatory study entitled “assessment of the efficacy of biodegradable sanitary pads: a survey study among college staff and students”, a total of 160 subjects were enrolled, of which 150 subjects responded.

Observations were conducted in various aspects:

**Table 1: Age wise distribution.**

Age wise (years)	Observations
Up to 20	42
21 to 30	99
31 to 40	4
More than 40	5

**Table 2: Occupation wise distribution.**

Occupation wise	Observations
Student	141
Office job	5
Teaching faculty	4

In this study, the maximum number of female participants are 21 to 30 years (66%), minimum participants are above age of 31 years (6%).

This study shows maximum number of participants (94%) were student.

**Table 3: Material used as a sanitary product.**

Sanitary product	Observations
Menstrual pads	95.3%
Tampons	0.7%
Menstrual cups	2.7%
Cloths	1.3%

In this study, the maximum number of females observed using menstrual pads was 95.3%, menstrual cups were 2.7%, tampons were 0.7% and cloths were also used by 1.3%.

In this study, 93.2% females got their menstrual cycle regularly, whereas only 6.7% females had irregular cycles.

**Table 4: Menstrual pattern-wise distribution of pads used.**

Menstrual cycle	Observations
Regular	93.3%
Irregular	6.7%

In this study, regarding menstrual flow, most ladies, i.e., 82.7% had medium flow; some, i.e., 12.7% had heavy menstrual flow, and few, i.e., 4.7% had scanty flow.

**Table 5: Menstrual quantity-wise distribution of pads used.**

Menstrual flow	Observations
Heavy	12.7%
Medium	82.7%
Scanty	4.7%

In this study, 62% of participants were interested in using the biodegradable pads in their future, whereas 38% participants denied.

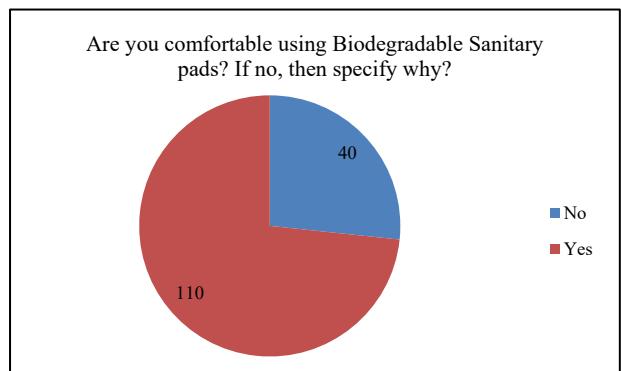
**Table 6: Interest in future usage of biodegradable sanitary pads.**

Continue using these same sanitary pads?	Observations
Yes	62%
No	38%

In this study, only 4.7% participants rejected these sanitary pads as environmentally friendly, whereas the remaining participants gave a positive response.

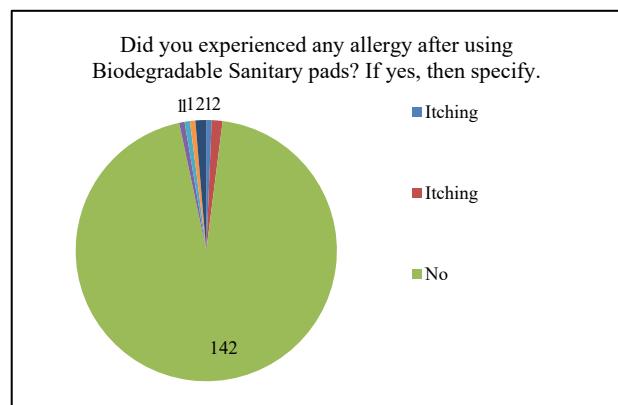
**Table 7: Environmentally friendly pads.**

Are sanitary pads environmentally friendly?	Observations
Yes	95.3%
No	4.7%



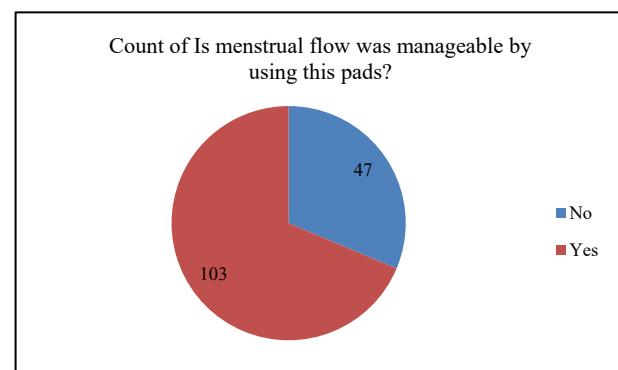
**Figure 1: Comfort while using sanitary napkins.**

In the Figure 1, 73.4% (110) of women were comfortable while using the napkins, 26.6% (40) denied the comfort and gave different opinions like uncomfortable, sticky, small in size, skin rashes, and leakage was observed.



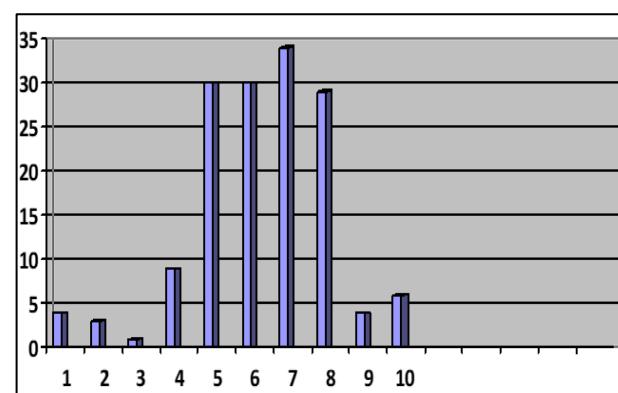
**Figure 2: Allergy while using sanitary napkins.**

This graph indicates that after the use of sanitary pads, 94.7% (142) subjects do not experience any allergy; whereas 5.3% (8) mentioned they had an allergy and itching.



**Figure 3: Managed period flow.**

In this study, 68.7% (103) females managed their menstrual flow with these sanitary pads, whereas the remaining 31.3% (47) couldn't manage the flow.



**Figure 4: Overall experience.**

Ratings given by females for the overall experience after using napkins were from 1 to 10, of which 22.7% (34) females gave a 7 rating. And the other 20% (30) was given to 5 and 6 stars.

## DISCUSSION

Menstrual days are very sensitive for hygienic purposes, and all women should have access to them. Products like sterile cloths, sanitary pads, tampons, menstrual cups, period panties, etc., can effectively manage menstrual flow. Ideal products shall have properties like being free from infective focus, acids and alkali, and sufficient absorbency to manage normal to heavy flow, preventing infections, reducing odor, and ensuring comfort. Conventional sanitary pads have considerable effects on the environment because they are not biodegradable and contain chemicals in their manufacturing process.<sup>13</sup> Conversely, biodegradable alternatives make use of natural materials like bamboo, cotton, and hemp. The variations in material makeup influence their effects on both the body and the environment.<sup>14</sup>

Biodegradable sanitary napkins have emerged as a revolutionary product in feminine hygiene, addressing menstrual hygiene and environmental concerns.

The new concept of biodegradable sanitary napkins is scientific and have emerged as a revolutionary product in feminine hygiene, addressing menstrual hygiene and environmental concerns.<sup>15</sup> Understanding this, the survey was designed to analyze the efficacy of the Biodegradable sanitary pads.

From the above observations, most participants were able to manage their menstrual flow effectively using the same, indicating the product's general efficacy. The majority did not experience any allergic reactions, which is a positive outcome for product safety.

As though the product was accepted by the majority of subjects, few complications were reported as small sized pad for heavy flow, and adherence of the pad to inner clothes. However, approximately one-third population faced challenges, possibly due to pad size, absorbency, or fit again pointing to the need for customizable or diverse product options.

Ratings for overall experience varied from 1 to 10, with 22.7% giving a rating of 7, and a cumulative 4, 5, and 6 stars were rated by 20% each. This suggests moderate satisfaction among users, with room for improvement in performance and comfort. This can be overcome through manufacturing modifications.

A notable number of females expressed interest in using biodegradable sanitary pads in the future, showing a positive attitude toward environmentally sustainable menstrual products. This shows potential for the growth of sustainable menstrual hygiene products in the market.

This study has some limitations. The study has not explored the long-term effects or sustainability of using biodegradable sanitary pads. Further study may be suggestive on a large scale.

Authors want to highlight that above said study may be useful as a pilot framework for futuristic studies, like to Investigate the potential for biodegradable sanitary pads to reduce waste and minimize environmental harm. The same study can be done in meno-metrorrhagic patients where pathologic purview can be correlated.

## CONCLUSION

The study concluded that biodegradable sanitary pads revealed overall satisfaction and minimal side effects. However, there is a clear need for product innovation in comfort, skin safety, and flow management. The growing interest in biodegradable options reflects increasing awareness of environmental impact, which should be leveraged to introduce more sustainable menstrual hygiene products. Manufacturers and health educators should work together to improve product design, address user concerns, and promote menstrual health.

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## REFERENCES

1. Dutta D, Badloe C, Lee H, House S. Supporting the rights of girls and women through menstrual hygiene management (MHM) in the east Asia and Pacific Region: Realities, progress and opportunities. UNICEF East Asia and Pacific Regional Office (EAPRO), Bangkok, Thailand. 2016;1-228.
2. Anton B, Kim W, Nair A, Wang E. Menstrual hygiene management- evidence from the 6<sup>th</sup> round of MICS. Data and Analytics Section Divivision of Data, Analytics, Planning and Monitoring, UNICEF. New York; 2021:11.
3. Roeckel S, Cabrera-Clerget A, Yamakoshi B. Guide to menstrual hygiene materials: UNICEF; 2019:6-36.
4. Chauhan S, Kumar P, Marbaniang SP, Srivastava S, Patel R, Dhillon P. Examining the predictors of use of sanitary napkins among adolescent girls: a multi-level approach. PLoS One. 2021;16(4 April):1-14
5. Biswas S, Alam A, Islam N, Roy R, Satpati L. Understanding period product use among young

women in rural and urban India from a geospatial perspective. *Sci Rep.* 2024;14(1):20114.

- 6. Saini B, Khapre M, Kumar P, Bharadwaj R, Gupta A, Kumar S. Prevalence and barriers of menstrual hygiene practices among women of reproductive age group in rural field practice areas of a tertiary care center in Rishikesh. *Indian J Community Med.* 2024;49(1):82-90.
- 7. Kaur R, Kaur K, Kaur R. Menstrual hygiene, management, and waste disposal: practices and challenges faced by girls/women of developing countries. *J Environ Public Health.* 2018;1-9.
- 8. Shannon AK, Melendez-Torres GJ, Hennegan J. How do women and girls experience menstrual health interventions in low- and middle-income countries? Insights from a systematic review and qualitative metasynthesis. *Cult Health Sexual.* 2021;23(5):624-43.
- 9. Hennegan J, Montgomery P. Do menstrual hygiene management interventions improve education and psychosocial outcomes for women and girls in low and middle income countries? A systematic review. *PLoS One.* 2016;11(2):1-21.
- 10. Bolden AL, Rochester JR, Schultz K, Kwiatkowski CF. Polycyclic aromatic hydrocarbons and female reproductive health: a scoping review. *Reprod Toxicol.* 2017;73:61-74.
- 11. Santangeli S, Maradonna F, Olivotto I, Piccinetti CC, Gioacchini G, Carnevali O. Effects of BPA on female reproductive function: the involvement of epigenetic mechanism. *Gen Compar Endocrinol.* 2017;245:122-6.
- 12. Sharma S, Mehra D, Brusselaers N, Mehra S. Menstrual hygiene preparedness among schools in India: a systematic review and meta-analysis of system-and policy-level actions. *Int J Environ Res Public Health.* 2020;17(2).
- 13. Matos J, Martins CI, Simoes R. Circularity micro-indicators for plastic packaging and their relation to circular economy principles and design tools. *Sustainability.* 2024;16(5):2182.
- 14. Elango J, Zamora-Ledezma C, Maté-Sánchez de Val JE. Natural versus synthetic polymers: how do they communicate with cells for skin regeneration- a review. *J Compos Sci.* 2023;7(9):385.
- 15. Kumar CK, Kumar GS, Subrahmanyam P, Srinivas B, Parameshwar K. A comprehensive review on biodegradable sanitary napkins for sustainable menstrual health and environmental hygiene. *Adv Pharma J.* 2023;8(5):119-27.

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