

Anti-Bacterial Sanitary Napkin Using Biomaterial Application

Dr. Sudharani B Banappagoudar¹, Mayank², Dr. Ravi², Dr. N. Kripa³, R. Kishore Kanna⁴, Noble K Kurian⁵

Professor¹, Assistant professor^{2,3,4,5}

School of Nursing¹,

Department of Biochemical Engineering², Department of Electrical Engineering²,

Department of Biomedical Engineering^{3,4}

Department of Microbiology⁵

ITM University, Gwalior(MP)¹, b.t.k.i.t dwarahat Almora², DCRUST, Murthal²,

Bharath Institute of Higher Education and Research^{3,4}

Atmiya University⁵

Abstract:

On an average a woman uses 15000 pads through her lifetime while menstruation. A packet of sanitary napkins comprising of usually 8 or 10 napkins in India will cost you nearly 28 to 150 Indian rupees. The price might seem reasonable but actually using these napkins per month every women needs at least 3 packets of these sanitary napkins that will cost around 300 rupees per month and due to poverty in India some women in rural areas or who are poor prefer to use old cloth as a sanitary napkin during their periods because they can't afford sanitary napkins per month due to unemployment and this is the reason for their poor personal hygiene and infections [5][10]. The women has to change their sanitary napkins after every 3-4 hours but due to busy schedule of working women whether in corporate world or household ladies forget to change their napkins due to work load and this leads to the infections and also cancers and cysts. The unemployment rate in India has increased and according to international labour organisation the unemployment rate is 3.5% and 70.62 million people live under extreme poverty with less than 133.99 rupees per day and due to this reason, the cost of sanitary napkin is often unattainable. The government and other NGOS have been providing free pads to school girls and rural women. In India it has been anticipated that 1 out of 5 girls drop out of school when they start menstruating [11]. 'Period Poverty' is the term used when there is lack of sanitary products, and other essentials like toilets due to financial constraints in region. According to statistics, 60 percent of adolescent girls miss school due to their periods, and about 80 percent still use homemade pads. In addition,

12 percent of India's 355 million menstruating women use pads (sanitary napkins), and 88 percent use unsanitized cloth fabric, ashes, and dry leaves, posing a wide range of health risks. In India, numerous types of terrible menstruation hygiene conditions are responsible for 70% of all reproductive illnesses and disorders. According to the researchers, 71 percent of females are unaware of period hygiene until after their first period. This research therefore estimated the utility of developing the highly absorbent, biodegradable and antibacterial sanitary pads from banana fibre and neem as an antibacterial agent. This modification in sanitary napkins would bring about the development of economical quality pad that would allow poor school girls to attend their schools without interruption and also help the women to maintain a better hygiene and prevent them from reproductive diseases.

Keywords: unhygienic, banana fibre, sanitary napkin, neem, oil cloth, menstruation, period povert

INTRODUCTION

India is a country with a population of 1.33 billion among which 48% are females and 52% are males. Only 12% of India's 355 million menstruation women use sanitary pads, while 88 percent utilise unsanitary textile fabric, ashes, and dry leaves, which can lead to a variety of health and reproductive issues. In India, 'Period poverty' is a term which means lack of access to sanitary napkins and toilet hygiene for women. India is a country where still 70.62 million people live under extreme poverty with the per day wage of round 134 Indian rupees and hence cost of sanitary napkin is unattainable.

The major physiological changes in girls are when she starts menstruating. Today menstruation is not only a health concern but also an educational policy to create awareness among girls as well as women. Lack of sanitary napkins and awareness about periods and hygiene can lead to many health problems and reproductive diseases. In India, 70% of the reproductive diseases are due to poor hygiene and sanitary napkins used during menstruation. During menstruation, the girls stop going to school or either they quit schooling once they start to menstruate. 1 out of 5 girls quit schools once they begin to menstruate [8].

Menstruation is a natural and normal process that occurs in girls and women of reproductive age every month when the uterus begins to lose blood and tissues via the vaginal canal in preparation for pregnancy. However, if there is no pregnancy, the uterus or womb sheds its lining, and monthly bleeding consists partially of blood and tissues from within the uterus. The first period normally occurs around the age of 12 and is referred to as 'menarche.' It can begin as early as eight o'clock. In young women, the time between the starting day of one period and the start of the next period is 21 to 45 days, while in adults, it is 21 to 35 days. The menstruation stops at the age of 45 to 55 years and this offset of menstruation is known as 'menarche'

The average time a women should use a sanitary napkin is 3 to 4 hours and after that the sanitary napkin needs to be changed. Wearing a sanitary napkin for more than 4 hours or 5 hours can lead to rash, redness, itching and swelling and sometimes the heat and moisture in vaginal area can contribute to bacterial build up and can cause infection and reproductive problems. The rash from pads are a result of contact dermatitis when the external skin of vagina gets irritated by some layer of pad or by the material used in the pads example; back sheet, fragrance, adhesives etc. The top and back sheets of sanitary napkins are usually made up of polyolefin's, zinc oxide and petrolatum that are often used in skin moisturisers can react with the skin of vagina and can cause rash and redness. A study estimates that the 0.7% of rashes are due to the allergies caused due to adhesives used in the sanitary napkins that are FDA approved similar to art and craft glues. Friction from wearing a pad can also irritate sensitive skin and cause a rash.

Women must be cautious when it comes to menstruation hygiene, as it may lead to a variety of difficulties, including reproductive illnesses. In India, women still use old clothing as sanitary napkins, especially in rural regions, and the fabric used is not cleaned. Urinary tract infections, vaginal infections, and rashes can all be caused by poor period hygiene, which can lead to issues. Due to poor period hygiene and pelvic discomfort, some women may develop vaginal infections, which can exacerbate reproductive problems. Pelvic discomfort can also result in excessive bleeding, which can cause anaemia. If used for an extended length of time, an overly wet pad can harbour bacteria and cause urinary tract and vaginal infections. When tampons are left in the vaginal area for an extended period of time, they can induce toxic shock syndrome, which can lead to death due to the bacterium *Staphylococcus aureus*, sometimes known as staph, infiltrating the body.

MATERIALS USED

1. Banana fibre
2. Cotton
3. Neem
4. Oil cloth

1. BANANA FIBRE

Banana plant does not only produces delicious fruit but it also provides textile fibre known as banana fibre. Banana fibre is a natural fibre having low thickness, appropriate rigidity and mechanical properties and high disposability and renewability. It is also recyclable and biodegradable. Banana fibre is a fibre obtained from pseudo-stem of banana plant. Banana plant is perennial and available throughout India, Southeast Asia, Thailand, Bangladesh, Indonesia, Malaysia, Philippines, Hawaii, and some pacific islands.



Fig.1 Banana Fibre

➤ **PROPERTIES OF BANANA FIBRE**

- It has a similar look to bamboo fibre, yet its fineness and spinability are superior to bamboo fibre.
- Cellulose, hemicelluloses, and lignin make up the chemical makeup of banana fibre.
- It is a robust but light-weight fibre.
- It has excellent moisture absorption properties. It absorbs and releases moisture at a rapid rate.
- It is biodegradable and has no negative impact on the environment, thus it falls into the eco-friendly category.

2. COTTON

Cotton is a fluffy fibre that grows in a protective case in cotton plants that are shrubs native to tropical and subtropical regions of the world, including the Americas, Africa, Egypt, India. The fibre is almost pure cellulose.



Fig.2 Cotton

➤ **PROPERTIES OF COTTON**

- Cotton is sustainable, renewable, and biodegradable
- It is eco-friendly fibre.
- It Absorbs water and breathable material.
- It is natural, cellulosic fibre.
- It is soft, light weight and absorbent material.

3. OIL CLOTH

Oil cloth is also known as enamelled cloth or American cloth. It is a linen cloth with a coating of boiled linseed oil to make it waterproof.



Fig. 3 Oil

cloth

➤ **PROPERTIES OF OIL CLOTH**

- Oil cloth is water and stain resistant.
- Oilcloth made from linseed oil is biodegradable.

4. NEEM

The neem tree produces neem, which is a natural herb. It is a perennial plant. India, Nepal, Pakistan, Bangladesh, Sri Lanka, and the Maldives are the most common locations. The therapeutic virtues of neem have been used in India for over two millennia. Siddha and Ayurvedic practitioners think that neem products are anti-diabetic, antibacterial, antiviral, contraceptive, and sedative.

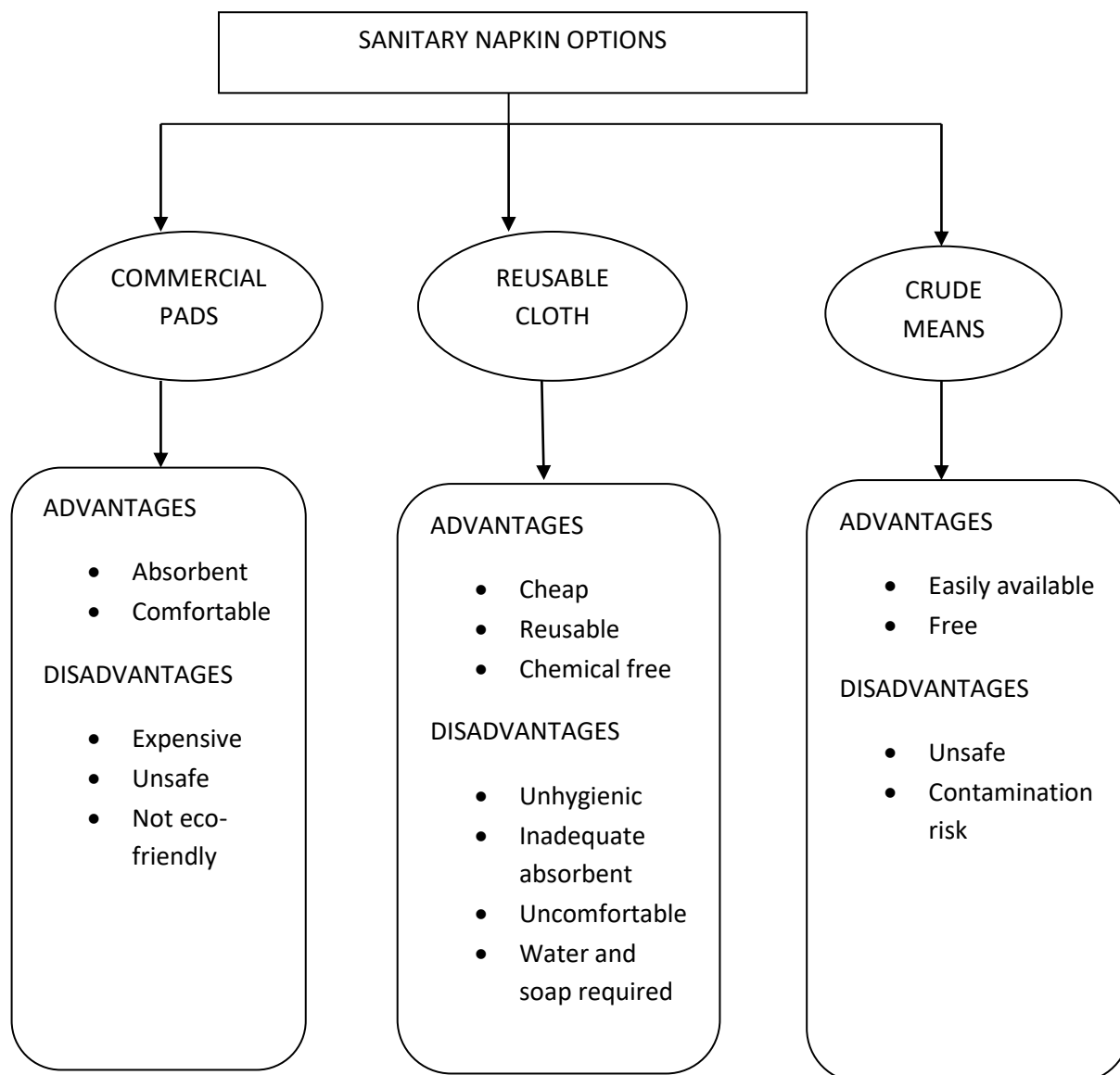


Fig.4 Neem

➤ **PROPERTIES OF NEEM**

- Neem is antibacterial, antiviral, anti parasitic
- Neem leaf has antibacterial properties.
- It is also antifungal.
- Neem leaf is also antioxidant, anti mutagenic and ant carcinogenic.

Figure illustrates the common types of sanitary options and their advantages and disadvantages



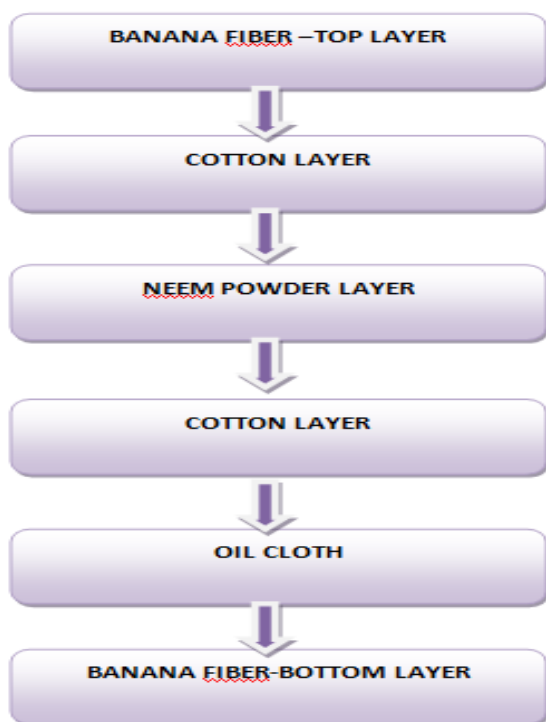
METHODOLOGY

Our approach and research is to develop an eco-friendly, biodegradable, antibacterial, antifungal, highly absorbent sanitary napkin. It is an initiative to make a proper organic sanitary napkin in complete sense by designing, developing a sanitary napkin from banana fibre, neem, cotton and oilcloth.

In this designing and development of a sanitary napkin we are going to use a banana fibre cloth that will act as a top and bottom layer like a packet. In this banana fibre packet, we are going to place the layers of cotton, neem powder and oil cloth. After all the layers are properly placed then we are going to sew it instead of using any adhesive that can cause irritation.

The purpose of choosing banana fibre is because it is highly absorbent and has better qualities than bamboo fibre and also neem will be added as an antibacterial, antifungal, anti allergic layer that will act as a protective barrier hence reducing the chances of redness, swelling, irritation and itching.

DESIGN OF THE SANITARY NAPKIN



CONCLUSION

In India, the unemployment rate has increased in these years and there are families that have earnings if less than 133 rupees per day so they can't afford the sanitary napkins due to the cost of napkins. But even if they buy the sanitary napkins the women or girls, use one sanitary napkin for one whole day and this can lead to infections and reproductive diseases further[1][8][11]. The most common method is using cloth by Indian rural women generally during their menstruation and the cloth they use is not sanitized and they reuse it after washing it again. So, there is no proper menstrual hygiene and it can have adverse health effects. Depending on these situations we are going to create a sanitary napkin that will be completely safe to use and 100% organic. We are using banana fibre, cotton, neem and oil cloth that makes this sanitary napkin completely organic that will not cause any irritation or redness or rash and also, the sanitary napkin will be anti-bacterial, antifungal, soft as well as biodegradable.

REFERENCES

- [1] Adika V.O, Yabga.J, Apiyanteide F.A, Ologidi P.W, and Ekpo K.E, "Perception And Behaviour On Use Of Sanitary Pads During Menstruation Among Adolescent School Girls In Bayelsa State, Nigeria", *Advances In Applied Science Research*, Vol.2(6), Pp.9-15, 2011.
- [2] Ann Mburu and Joseph Kinyanjui, "Development of a Highly Absorbent and Antibacterial Biodegradable Sanitary Pad from Bamboo", National Council for Science and Technology, Technology and innovation Week, Nairobi, KICC, May 2013.
- [3] Linda Scott, Paul Montgomery et.al, "Sanitary Pad Accessibility and Sustainability Study", University Of Oxford, October 2013.
- [4] Karl R. Woeller, Anne E.Hochwall, "Safety Assessment of Sanitary Pads with a Polymer Foam Absorbent Core", *Regulatory Toxicology and Pharmacology*, October, 2015.
- [5] Vishaka Goyal, "Scope and Opportunities For Menstrual Health And Hygiene Products In India", *International Journal Of Social Sciences*, Vol.5 (7), July 2016.
- [6] Julie Hennegan, Catherine Dolan, Laurel Steinfield, and Paul Montgomery, "A Qualitative Understanding of the Effect Of Reusable Sanitary Pads And Puberty Education: Implications For Future Research And Practice", National Centre For Biotechnology Information, June, 2017.
- [7] Barman A, Katkar PM AndAsagekar SD, "Natural And Sustainable Raw Material For Sanitary Napkins", *Journal Of Textile Science and Engineering*, 20 July, 2017.
- [8] Pooja Arugula, Suresh Kumar, Akhil Srirangam, Mounika Velumuri, "Perception on Use of Sanitary Napkins among Students In Khammam Locality: A Survey", *Indian Journal Of Pharmacy Practice*, 2017.
- [9] AsmantoSubhagyo, AchmedChafidz, "Banana Pseudo-Stem Fibre: Preparation, Characteristics and Application", *Intechophan*, 28 November, 2018.
- [10] Rajanbir Kaur, Kanawaljit Kaur, Rajinder Kaur, "Menstrual Hygiene Management And Waste Disposal: Practices And Challenges Faced By Girls/Women Of Developing Countries", *Journal Of Environmental and Public Health*, 20 February, 2018.
- [11] Tanvi Nitin Deshpande et.al, "Menstrual Hygiene Among Adolescent Girls-A Study From Urban Slum Area, *Journal Of Family Medicine and Primary Care*", 30 September, 2018.

[12] "Always Pads Testing Results Linked To Cancer and Reproductive and Developmental Harm", Womenvoices.Org.

[13] "Reviews on the menstrual health and hygiene", World Health Organisation, Geneva, Switzerland, 2018.

[14] Belen Torondel et.al, "Association between Unhygienic Menstrual Management Practices and Prevalence Of Lower Reproductive Tract Infection: A Hospital Based Cross-Sectional Study In Orissa, India", NCBI, 21 September, 2018.

[15] Robert Preidt, "Menstrual Cups Safe and Effective, Study Says", Web MD, 17 July, 2019