The European Journal of Research and Development

journals.orclever.com/ejrnd

OR CLEVER Science & Research Group

Research Article

Investigation of Physical and Liquid Performance Properties of Feminine Hygiene Pad in Commercially Used

Ebru Çelikten[1*], Kubilay Özden[2], Mehmet Daşdemir[3], Tülin Kaya Nacarkahya[4]

[1] Karafiber Tekstil Ind. Trade Inc. R&D Center, Gaziantep, Turkey, (ORCID: 0000-0002-5872-1949), ebru.celikten@karaholding.com

[2] Karafiber Tekstil Ind. Trade Inc. R&D Center, Gaziantep, Turkey, (ORCID: 0000-0002-7765-6943), kubilay.ozden@karaholding.com

[3]Gaziantep University, Textile Engineering Department, Gaziantep, Turkey, (ORCID: 0000-0001-7165-6574), dasdemir@gantep.edu.tr

[4]Karafiber Tekstil Ind. Trade Inc. R&D Center, Gaziantep, Turkey, (ORCID: 0000-0002-9108-6713), tulin.kaya@karaholding.com

[*] Correspondence: ebru.celikten@karaholding.com

(First received October 10, 2021 and in final form March 12, 2022)

Atıf/Reference: Celikten, E. Ozden, K. Dasdemir, M. Nacarkahya Kaya, T. (2022) Investigation of Physical and Liquid Performance Properties of Feminine Hygiene Pad in Commercially Used. The European Journal of Research and Development, 2(1), 34-39.

Abstract

Globally, the rate of use of disposable personal care products is increasing day by day. In general, one of the most important disposable personal care items is the feminine hygiene pad for all women. Feminine sanitary pads have some basic properties. These are; liquid absorption, preventing leakage, odor control, feeling comfortable, etc. In this study, it was aimed to investigate the physical and performance properties of commercially used feminine hygiene pads. For this purpose, the layers of 7 different feminine hygiene pads were analyzed by separating them from each other. And also, liquid performance tests were carried out as pads. According to the obtained test results, feminine sanitary napkins have different construction such as production technology of layers and raw material. Therefore, the thickness and weight of the pads are shown variability. In addition, it has been determined that these variations significantly affect the liquid performance properties of the pads.

Keywords: Feminine hygiene pad, liquid strike through time, wetback.

1. Introduction

Disposable sanitary napkins are very popular all around the world. The first disposable sanitary pad was produced by Johnson & Johnson in 1896. The Kimberly-Clark Company was produced another napkin is the name of Kotex in 1921 [1]. The sanitary napkins are designed not only to absorb menstrual liquid but also to provide every woman's health, comfort, and lifestyle [2, 3]. Many different types of sanitary napkins are available in the market in terms of such as soft, natural, various sizes and thickness, etc. [4, 5].

Generally, the sanitary napkins consist of four main layers and each layers have some specific properties (Figure 1). The first layer is the top sheet which quickly transfers the liquid to the second layer ADL. The ADL (acquisition distribution layer) scatter different areas of the pad and also transfer to the third layer that means the absorbent core layer. The task of the absorbent core layer is to absorb and retain the fluid. Generally, the absorbent core layer consists of wood pulp and super absorbent powder (SAP) to increase its absorption efficiency. The fourth layer or last layer is the back sheet that has to be breathable film structure [1,2,4,5].

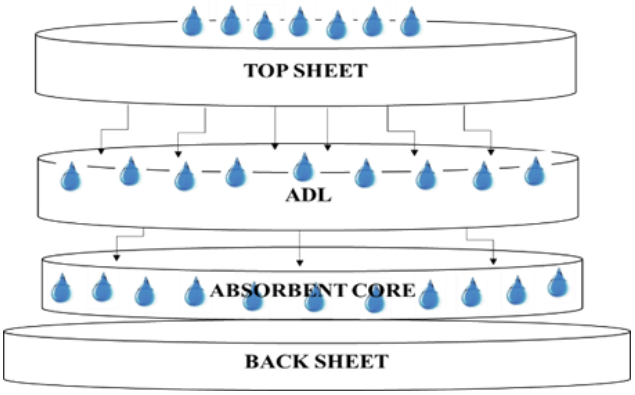

Figure 1 General structure of sanitary napkin

In this study, some commercial sanitary napkins were investigated the physical and performance properties. The layers of 7 different feminine hygiene pads were analyzed by separating them from each other. And also, liquid performance tests were carried out as pads. According to the obtained test results, feminine sanitary napkins have different construction such as production technology of layers and raw material. Therefore, the thickness and weight of the pads are shown variability. In addition, it has been determined that these variations significantly affect the liquid performance properties of the pads.

2. Materials and Methods

Different hygiene pads were taken available in the market. All pad layers were separated and investigated to determine the production technology. Table 1 is shown that the production properties of layers.

The liquid strike through time and wetback were measured according to the NWPS 70.7 and NWPS 70.8, respectively. The napkins were tested using artificial blood test fluid. The artificial blood surface tension value is 43.3 mN/m and viscosity value is 4.04 Cp. The tests were carried out with 5 replicates of each sample.

Table 1 Production properties of pad layers

Hygiene Pad / Layers	HP1	HP2	HP3	HP4	HP5	HP6	HP7
Top Sheet	Film& Spunbond	Film	Film	Film	Film	Film	Spunlace
ADL	Air-laid	Air-laid	Spunbond &Air-laid	Spunbond &Air-laid	Spunlace	Air-laid	Spunlace
Absorbent Core	Air-laid	Air-laid	Air-laid	Air-laid	Air-laid	Air-laid	Spunlace
Back Sheet	Film	Film	Film	Film	Film	Film	Film

3. Results

All pads were selected according to use type for the night. General dimension properties were measured on all the pads (Table 2). It can be seen that in Table 2, the average pad weight is approximately 7.5 gsm and the average pad thickness is 2.4 mm. On the other hand, the ADL and the CORE layer dimension values are close to each other.

Table 2. General dimension properties of hygiene pads

Hygiene Pad Code	HP1	HP2	HP3	HP4	HP5	HP6	HP7
Total Average Weight (gsm)	9,2	8,1	6,6	7,4	5,7	6,8	9,0
Total Average Thickness (open)-(mm)	3,0	2,5	2,4	2,0	2,4	2,0	2,8
Total Average Length (cm)	30,5	27,7	28,5	28,0	28,0	31,5	27,5
Total Average Width (included wings)-(cm)	16,0	15,5	14,5	16,0	15,0	16,0	15,5
Average Length of ADL (cm)	27,5	24,0	25,5	25,0	26,0	28,5	25,0
Average Width of ADL (cm)	7,5	6,5	6,5	6,5	6,5	7,0	7,5
Average Length of CORE (cm)	23,5	24,0	22,5	22,0	22,5	20,0	21,5
Average Width of CORE (cm)	6,5	6,5	6,0	6,0	6,0	6,5	7,0

One of the most important features in feminine hygiene pads is liquid strike-through time. In this test, 3 different liquid strike-through times are determined. While the 1st measurement time is taken as a basis for normal and daily pads, all times including the 3rd measurement time are important for night pads. The liquid strike-through time and wetback tests were performed with artificial blood. The results of liquid strike-through time are presented in Figure 2.

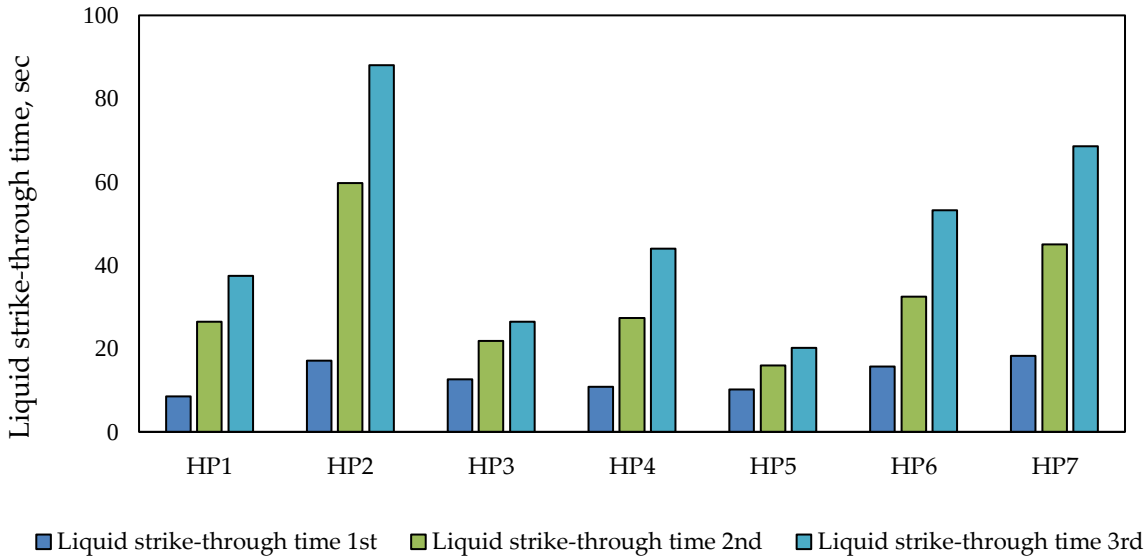

Figure 2 Liquid strike-through time of all pads

When the 1st, 2nd, and 3rd liquid strike trough times of the pads were examined together, it was determined that the HP5 branded products had the lowest values (Figure 2). Unlike other hygiene pads, it has been determined that the spunlace ADL layer changes the results due to its structural properties (production technology and raw material).

When the investigation of liquid strike-through time test results, the best result was obtained from HP1 branded products with 8.6 seconds in the 1st liquid strike-through time, while the worst result was obtained from HP7 branded products with 18.3 seconds (Figure 2).

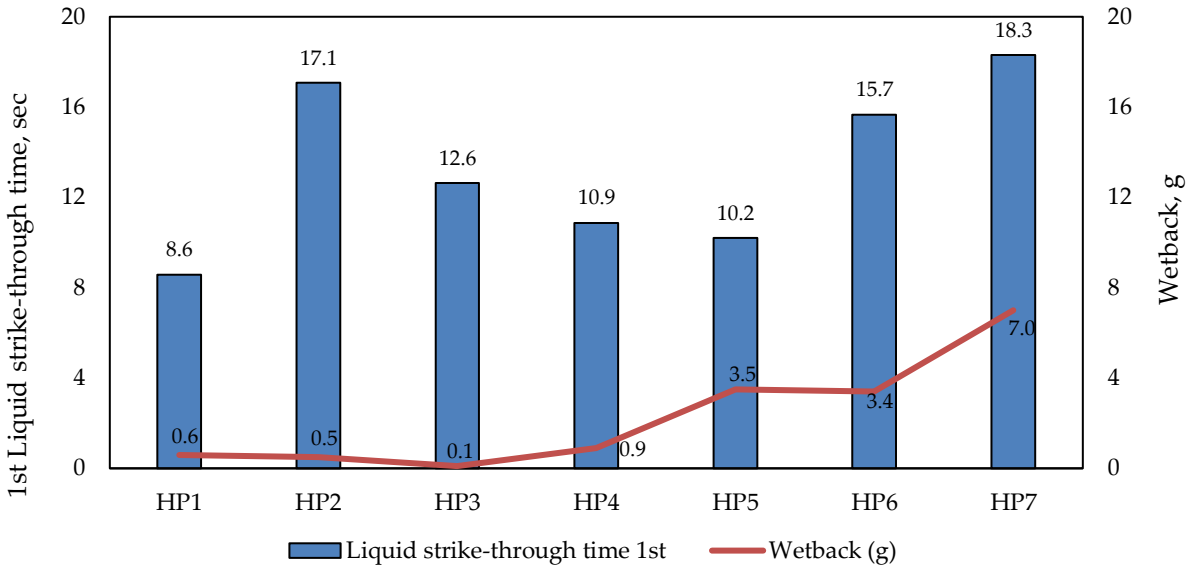

Figure 3 First liquid strike-through time and wetback values of all pads

After the liquid strike-through time test, wetback tests are carried out to measure how much of the given amount of the liquid is returned. As a result of this test, products that return the lowest amount of liquid are preferred.

When the wetback test results of the products are examined, it is concluded that there are serious differences between the pads because of the structure and production technology of the pad layers (Table 1). The best result in wetback values was obtained from HP3 branded products with 0.10 g, the worst result was obtained from HP7 branded products with 7 g (Figure 3).

4. Discussion and Conclusion

The sanitary napkin layers have different structural properties such as production technology, raw material, design, etc. Therefore, the liquid performance properties of napkins can be changed according to these parameters. Within the scope of this study, among the pads examined the lowest liquid strike-through time (1st, 2nd and 3rd) was obtained from HP5 branded products, while the lowest wetting back values were obtained from HP3 branded products.

5. Acknowledge

This study was fully supported by the Scientific and Technological Research Council of Turkey (TUBITAK).

References

[1] Pohlmann, M. (2016). Design and Materials Selection: analysis of similar sanitary pads for daily use. *Journal of Engineering Research and Application, 6*(11), 74-79.

[2] Priya Petchimuthu, R. P. (2019). Production of Cost Effective, Biodegradable,Disposable Feminine Sanitary Napkins using Banana Fibres. *International Journal of Engineering and Advanced Technology (IJEAT), 9*(1S4), 789-791.

[3] M.Dhinakaran, C. k. (2017). Development And Characterısatıon Of Sanıtary Napkıns Wıth Lyocell / Modal As Absorbent Core. *International Research Journal of Engineering and Technology (IRJET), 4*(2), 1003-1006.

[4] Yadav Manisha, G. D. (2019). Study of Sanıtary Napkıns Properties Commercıally Avaılable In Indıa. *AUTEX2019 – 19th World Textile Conference on Textiles at the Crossroads*, (pp. 1-3).

[5] Aksoy, A. (2012). Tek Kullanımlık Bakım Ve Hijyen Ürünlerinin Performans Özelliklerinin Araştırıması Üzerine Bir Çalışma. *Süleyman Demirel Üniversitesi, Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi*.

[6] A, K. P. (2017). Natural and Sustainable Raw Materials for Sanitary Napkin. *Journal of Textile Science & Engineering, 7*(3), 1-3.