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THE 24-HOUR PAD TEST: PAD COMPOSITION AFFECTS ACCURACY

Hypothesis / aims of study

Although the 24-hour pad test has become a widely used outcome measure, the type of pad used for the test is not always stated. Continence pads vary enormously in overall dimensions, thickness, composition and amount of water-absorbing superabsorber pulp therein. Such variation in pad characteristics could particularly influence the results of studies in normal women, in whom absorption of body secretions while exposed to the warm perineum could have a large effect.

Previous studies of continent women indicated normal values of 2.6-7.0g but a very recent study revealed a "dry" pad weight of only 0.3g per 24 hours. The type of pad (and number of pads worn on the perineum per 24 hours) were not stated by early authors. We hypothesise that each pad may vary in its absorption of perineal fluids and evaporation of such fluids over time. Therefore we tested a wide range of pads, with variable amounts of fluid applied to measure absorption and evaporation over varying timeframes at 37º Celsius using a humidified incubator as a substitute for the perineal environment. In doing so, we sought to identify pad-types which faithfully maintained the amounts of fluid originally applied, as these pads would be the most accurate measures of leakage.

Study design, materials and methods

The types of pads used are in the following table

Pad Type	Average dry weight	Superabsorber Pulp (g)	Dimensions (mm)	Total capacity (mL)	Working capacity (mL)
Carefree Pantyliner*	2.4	0	140 x 40	-	-
Tena Active Long	3.6	1.5	175 x 70	45	25
Tena Normal	17.6	14	273 x 143	360	215
TenaComfortMiniExtra**	24.7	16	340 x 160	890	534

Firstly, the equivalent evaporation characteristics of urine and normal saline (N/S) (0.9% w/w) were tested by instilling three of each of the four pad types with 10ml of Normal Saline (0.9% w/w) and urine, placing them in room air, and weighing them after 4 and 8 hours. All weights were measured using an accurate beam balance (MFD by A&D co. Ltd. Korea) accurate to 0.1g.

Next, to test for absorption of atmospheric moisture, 10 of each type of pad were placed dry in an incubator set at 37 degrees Celsius, at a CO2 of 5%, humidified with a 30 x 30cm tray containing 1 Litre of distilled water. These pads were weighed at 0, 4 and 8 hours.

Finally, to test evaporation from a wet pad over time, 10 of each of the four pads (n=40) were instilled with 2.5, 5 and 10ml of warmed N/S (total n=120) and weighed at 0, 4 and 8 hours. The larger pads were also instilled with 20 and 50 ml N/S (closer to their working capacity; additional n=20).

Results

Urine and Normal Saline evaporation was identical. After exposure of dry pads to a humidified incubator, some pads (Carefree pantyliner and Tena Normal) lost a small amount of weight (0.1-0.2 mls), while others (Tena Active Long, and Comfort Mini Extra) actually gained weight (0.2 mls) The evaporation of fluid instilled was much greater at 8 hours compared to 4 hours. The small pads (Carefree and Tena Active) tended to lose almost all their fluid (60-83%) after 8 hours in the incubator, especially with 2.5 and 5mls instillation. However, larger pads (Tena Normal and Tena Comfort Mini Extra) actually gained weight (between 2 and 44%) over time when instilled with these small volumes.

When instilled with larger fluid (i.e. 20-50mls) volumes, the larger pads were slow to evaporate, losing only between 5 and 21% of the volume instilled.

Interpretation of results

Using a humidified incubator as a substitute for the warm humid environment of the perineum, this study is the first to show that differing pad types vary considerably with regard to fluid evaporation and absorption. This can be minimized by decreasing the amount of time of each pad sits on the perineum (to 4 hours during a 24-hour pad test). Thinner Carefree and Tena Active pads should NOT be used for the 24-hour pad test, even for mild leakage, because these pads allow substantial evaporation of fluid on the pad, and may lead to falsely dry results. This finding may explain the low reference ranges (0.3g) of the more recent study of normal subjects[3], as thin Carefree pads were used for approximately 8 hours.

Concluding message

Accurate measures of mild leakage or post-treatment cure should be determined with Tena Normal or Tena Comfort mini extra pads (or others with similar composition), as these do not allow evaporation of low fluid volumes, but are capable of holding heavier water loss with minimal evaporation. In future the ICS should stipulate that the exact type of pad used for any pad test should be precisely recorded in all publications