

The Diaper Dilemma

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Abstract—Every parent wants to do everything they can do to ensure the health and wellbeing of their child. Starting from getting their little chimps get all the vaccinations right on time to ensuring the best nourishment for them, they do it all. It might sound absurd but there are several ways in which parents unknowingly harm their children as well. Using diapers is a worldwide practice now and is a hit trend that everyone opts for, to ensure comfort, for them as well as for their children. One can for once ignore the rashes and irritation they cause to the skin but can anyone dare to ignore the greater health problems and environmental disturbances that are caused? Most babies wear diapers nearly 24 hours a day, and those diapers are in constant contact with both skin and mucus membranes. This means that any chemical in diaper is likely to wind up in your baby's system! A silent killer...lowering the babies' immunity system and leaving the world wonder why girls are attaining puberty age earlier than before and why number of infertile males is increasing etc. We need to understand that like all the other technologies, this one has a negative side too and it's high time to revert ourselves back to the little troublesome yet greatly beneficial cotton diapers, with of course, a modern twist!

1. INTRODUCTION

The Middle English word *diaper* originally referred to a type of cloth rather than the use thereof; "diaper" was the term for a pattern of repeated, rhombic shapes, and later came to describe a white cotton or linen fabric with this pattern [1]

1.1 History of Diapers

When we think of diapers today, we generally think of Pampers or some other brand that is extra soft to protect the baby's skin yet strong enough to hold all the things they are supposed to for a long period of time. However, the history of diapers is very rich.

It would be the 60s and 70s that saw a major turn point in upcoming of disposable diapers. The year 1942 marked a splendid discovery in which Disposable diapers were invented by **Hugo Drangel** of the Swedish paper company. In the year 1946 **Marion Donovan** invented the "Boater" – a waterproof covering for cloth diapers. Her first model of the disposable diaper was a conventional cloth diaper inserted into shower curtain plastic [2]. With the 60's, the disposable diaper evolved quickly. Instead of tissue, a pulp mill was introduced and

using cellulose fibers instead of paper improved the performance of the diaper. By the 1970s the demand for disposable diapers had increased, new tapes were added for ease of fastening, and the shape was changed from rectangular to "hourglass."

During the early 1980s, modifications were made to respond to the demand for a better-fitting and biodegradable product. Since the beginning of the 21st century, as new and new technologies are established, the history of diapers only continues to improve. The diapers are getting lighter yet more absorbent. Today, diapers are becoming more comfortable and thinner [3].

Disposable diaper of today consist of a Cloth-like, plastic film that serves as the back sheet to prevent the liquid from leaking out, a tissue layer to carry the absorbent pad, an absorbent pad that contains: top sheet (in contact with skin), distribution layer (to move liquid to core of pad), cellulose or synthetic pulp, super absorbent gel, and bottom sheet. Topical lotions added to top sheet. Tapes and Elastics are added to secure the diaper and prevent Leakage.

Partially neutralized Polyacrylic acid is also added to diapers as a powder at about 4-5gm per diaper. Under pressure, it absorbs 30 times its weight in water, so a typical diaper can absorb 120-150mL of water. This design was developed by many researchers through trial and error.

Typically, it takes no more than five to ten seconds for the water to be absorbed by these particles. The polymer absorbs more pure water than it does solutions [4].

2. HEALTH ISSUES CAUSED DUE TO THESE DIAPERS

As mentioned above most babies wear diapers nearly 24 hours a day, and those diapers are in constant contact with both skin and mucus membranes. This means that any chemical in diaper is likely to wind up in the body system.

1. Diaper skin irritation: Researchers believe that it is the continued exposure to the dye that can causes a sensitization, or allergic reaction, in babies. [5]

2. Dioxin Exposure: Most disposable diapers are bleached white with chlorine resulting in a byproduct called dioxin. According to World Health Organization, exposure to dioxins may cause skin reactions and altered liver function, as well as impairment of the immune system, nervous system, endocrine system and reproductive functions. High doses of dioxin cause a skin disease called Chloracne.

The U.S. EPA released its dioxin reassessment in draft form in 2000, which concluded that dioxin should be classified as known human carcinogen [6].

3. Sodium Polyacrylate: It was once present in the tampons, but was removed for causing Toxic Shock Syndrome. It is a skin irritant, because it is able to absorb all of the oils and moisture from the skin, yielding a drying effect. It is no surprise that problems like diaper rash are almost non-existent for babies having cloth diapers [7].

4. Tributyl-tin (TBT): According to the U.S. EPA, this toxic pollutant is extremely harmful to aquatic life and causes endocrine disruptions in aquatic organisms. TBT is a polluting chemical that does not degrade but remains in the environment and in the food chain. TBT is also an ingredient used in biocides to kill infecting organisms. Additionally, according to research published by the American Institute of Biological Sciences, TBT can trigger genes that promote the growth of fat cells, causing obesity in humans.

5. Respiratory Problems: One study from 1999 found that the test rats exposed to emissions from disposable diapers experienced impaired breathing (Anderson, 1999). The study identified these chemical emissions from two brands of disposable diapers (specific brands tested were not disclosed):

- m-xylene
- p-anisaldehyde
- ethyl benzene
- styrene
- isopropyl benzene
- dipentene
- m-methoxybenzaldehyde
- Toluene
- Trichloroethylene
- 1, 2, 3-trimethylcyclopentane [6]

6. In addition, a 2001 UK study published in the Archives of Disease in Childhood suggests that infant boys who wear disposable diapers could experience impaired fertility as adults. The researchers found that the temperature of the scrotum was almost 2°F higher in boys who wore disposables diapers rather than cloth. This temperature increase, they say, may negatively impact future fertility [8].

3. ENVIRONMENTAL PROBLEMS

Disposable diapers lack quick biodegradability. Another concern is that viruses excreted in a baby's feces could end up leaking into the local water supplies. Many parents don't know that throwing feces into a landfill is illegal and they are supposed to dump the feces in toilet before throwing the diaper away. Likewise, because the diapers contain human waste, they may contain viruses and bacteria that can seep into the groundwater [9]. When the wood pulp from these trees is bleached to make disposable diapers more esthetically pleasing, it produces a low concentration of dioxins, a known carcinogen that could lead to infertility.

A disposable diaper is 70 percent paper pulp. The remaining 30 percent is made from petroleum, which is a finite resource and one whose combustion is closely tied with escalating climate change. According to the Atmospheric Radiation Measurement Program, landfills are known for producing greenhouse gas emissions, which can contribute to the earth's climate changes. Decomposing diapers release methane into the air. High concentration of the gas can be explosive and flammable. It's also dangerous to breathe because it replaces oxygen [10], [11].

4. CONCLUSION AND RECOMMENDATIONS

The reason behind increased usage of plastic diapers is the convenience associated with them. However, their counterpart, the Cotton diapers; which are little less convenient but environment friendly and healthy should be used. Although there are some arguments as to the stink they produce, but this problem can easily be solved by changing the detergent used or by applying washing soda in some cases. Apart from that there are some researches in progress which aim for making biodegradable and healthy diapers but at present we have the older but still very convincing cotton diapers. One should always opt for unbleached, organic cotton.

There are various other alternatives as well. Like, the Diaper services that deliver clean cloth diapers weekly or monthly, removing used diapers and cleaning them for redelivery. They are a great way to provide a baby with environmentally friendly cloth diapers with minimal work for mom and dad. gPants and gDiapers make environmentally friendly diaper covers that contain biodegradable, compostable, flushable, plastic-free inserts. The diapers are also dioxin-free and chlorine-free [12], [13].

Parents can also purchase soft, flushable diaper liners to line cloth diapers, making clean up much easier. For overnight protection, many companies sell organic cotton "diaper doublers," a thick piece of cloth you can tuck inside a cloth diaper for extra absorbency.

Awareness with regard to child health and care should be spread. Blind usage of any baby product, or say any product, be it diapers or soap, should be avoided.

5. ACKNOWLEDGEMENT

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