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EFFECT OF DETERGENTS AND CHEMICAL ADDITIVES USED ON CHILDREN CLOTHES AND THEIR AFFECTED WITH DERMATITIS

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ABSTRACT

Contact allergy to clothing is a matter of a concern. Although Textile dermatitis is common, it is frequently misdiagnosed. The exact incidence of textile contact dermatitis is unknown The most frequent causes of textile dermatitis are some Household products as detergents, cleaners, polishes, bleaches, disinfectants, sterilizers, and products for clothing.

Consumer Products Safety Commission that chemicals found in the homes identified 150 chemicals that had been linked to allergies, birth defects, cancer, and psychological abnormalities.

Randomized sample of 159 mothers from different socio-economic levels were submitted to questionnaires to collect information.

Children dermatitis resulted from chemical substances used in washing their clothes, whether detergent for cleaning, bleach for whiting, even fabric softeners for more beauty of clothes. Results submitted to statistical analysis showed appositive relation and co-relation between householder's substances and dermatitis in children. Dermatitis in children strongly related to detergents and chemical additives as bleach and fabric softeners.

Keywords: Detergents, Chemical Additives, Dermatitis, Formaldehyde Resins, Allergen Retention.

I. INTRODUCTION

[5,].

Clothes Caring is the main demand for fabric health. children's' clothes Caring is not only to keep the beauty appearance of clothes but also to keep children healthy too[1, 2], although Textile dermatitis is common, it is frequently misdiagnosed. The most frequent causes of textile dermatitis are disperse-dyes, formaldehyde resins and additives in washing [3]. Contact allergy to clothing containing additives is a matter of a concern [4].

It is well known that many microbes as bacteria, virus and protozoa in textile materials; are easily, quickly and freely transferred with children fun or friction through the textile materials. Textile Dermatitis considered the commonest among others due to wrong clothes caring mainly of the children [1].

Retention of allergens in clothing, after washing, may explain dermatitis in a patient who states compliance with avoidance of a seemingly relevant allergen. Dermatologists should consider the possibility of allergen retention in clothing whenever a patient has only partial clearing after at least 1 month of attempted compliance with avoidance of identified allergens. Purchase of new clothing may be required to clear allergic contact dermatitis in this situation

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During the last decade a considerable number of children and adolescents with contact allergy and Allergic contact dermatitis (ACD) have been described. However, the incidence and prevalence of contact allergy and ACD in children and adolescents is largely unknown, because of a lack of studies [5]

Allergic contact dermatitis (ACD) in children is seen occasionally, and several reports on series of children and adolescents with ACD have appeared [6-12].

Textile dermatitis is only one example of adverse health effects due to clothing. It may present with a wide spectrum of clinical features, but the main mechanisms are irritant dermatitis, often observed in atopics intolerant to wool and synthetic fibers, and allergic contact dermatitis, usually caused by dyes, finishing and textile additives[13].

Household products include detergents, cleaners and polishes, bleaches, disinfectants and sterilizers, dust removers, antistatic and deodorizers, office materials, removers, and products for clothing. Many of these contain chemicals that present a risk to those who come into contact with them. This contact may be through inhalation or dermal exposure for human[14] Some of the household products used for clothes are: Detergents, Bleach ,Fabric softeners[15].

Chemicals in household products have been paid much attention as main cause of health damage on consumers, such as allergic contact dermatitis [16].

1-Detergents: are chemically neutral substances (ph. = 7), sometimes an alkali is added to them to increase the efficiency of cleaning. Detergents may be liquid or in the form of granules which are the commonest in use [16].

2-Bleach: The main ingredient in chlorine bleach is sodium hypochlorite (chlorine added to lye.) Chlorine is toxic as a skin irritant, and by inhalation. Sodium hypochlorite can create poisonous chlorine gas if mixed with ammonia (which may be an unlabeled ingredient in some cleaning products) or with vinegar. Workplace safety data sheets warn that sodium hypochlorite may be a neurotoxin and cause liver damage. People with chemical sensitive report adverse reactions to minute quantities of chlorine. Sodium hypochlorite readily combines with organic matter to form organo-chlorines which are highly toxic to aquatic life [17]. Bleach: is one of the detergents' additives used fore removing dirt and bleach clothes more and more it can be oxidizing or bleach [16, 10].

Oxidizing Bleach reacts with the colored spots and change them into simple substances easily dissolved in water to get the clean white colors. Example is Sodium Hypo-chlorite (Clorox) and hydrogen peroxide H2O2 [1].

Reducing Bleach gives non-fixed results as they depend on the union of hydrogen resulting from the reaction of the spots or the color to remove them. Soon the spots reappear again due to the exposure atmospheric air to unite with oxygen, so this type is not recommended indoors [1].

3-Fabric Softener: Fabric softeners designed to reduce static in synthetic fabrics. They serve no purpose with natural fabrics. Fabric softeners may contain quarternary ammonium compounds (quats) and imidazolidinyl, both of which are known formaldehyde releasers. For about 5% of people, quats are an extreme sensitizer. They may cause a variety of asthma-like symptoms, including respiratory arrest. Exposure to formaldehyde can cause joint pain, depression, headaches, chronic fatigue and a variety of other symptoms. In lab tests formaldehyde has caused cancer and damaged DNA. Both quaternium and imidazolidinyl can cause contact dermatitis. Fabric softeners work by leaving a residue on the fabric which never completely washes out. It can cause allergic reactions through skin contact and inhalation. Fabric softeners may also contain carcinogenic coal-tar dyes, ammonia and very strong

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scents. When fabric softeners are exposed to hot water, heat from dryers or ironing, vapors may be emitted which can be deeply inhaled, increasing their impact [17].

Fabric softeners: is one of the detergents' additives used fore softening clothes and regaining the texture again back as if new. It is noticed that some types of clothes may stick to the body hardly, or to each other's; this is explained by the development of electrostatic charges in the artificial fibers clothes, which may cause deformity in the general appearance. This treated by adding Fabric softeners to the last washing cycle to act as an external layer that envelope the clothes to prevent the charges and prevent their sticking effects .[1, 15]

Fabric softeners added either during washing or during rising. The later may be in the form of sheets or in the form of packets

III EFFECT OF WASHING PROCESS IN CHANGING TEXTILE PROPERTIES

Repeat washing process has direct effects on textile properties. This is directly related to dermatitis, as the weight, thickness, texture, permeability and consistency ... Repeat washing leads to increase in density and number of textile threads (cover factor of the fabrics) [15].

Artificial fibers are not preferred for children clothe especially the underwear. Acrylic is one of the artificial fibers, That causes not only dermatitis but also it can change during washing in the electric-dryers into very fine fibers not seen by the naked-eyes ,and may be in the form of arousals distributed in the atmosphere to fine its way along the respiratory system to enter our body and damages the lungs seriously[18].

The effects of most additives on fabrics depends also on the textile materials .Cotton fabrics has more permeability to additives more than artificial fibers. it is obvious that additives have serous effects more on cotton than other textile s especially on dyes .Dyes and resins are considered one of the common causes of textile dermatitis with increased incidence with additives. When bleaches are used with Dyes they act as an allergens. The main function of formaldehyde resins is to impart wrinkle resistance during wear and laundering to 100% cotton and more typically to cotton/polyester blends of fabrics [19]. There are two possible theories as to how formaldehyde sensitivity can result in contact allergy to permanent press clothing [20].

Formaldehyde release occurs either when there is incomplete cross-linking of some resin, which allows degradation of the resin by chlorine bleach with release of formaldehyde, or by hydrolysis under warm moist conditions[21].

What would happen when you wash your children clothes with toxic chemicals. Of course, not all of the chemicals wash out so children wear clothes all day they are absorbing chemicals in small amounts through their skin. Then they sleep on sheets and pillows cases all night, absorb more toxins, and breathe in the fumes particles they continue to give off. Phosphorous, enzymes, ammonia, naphthalene and phenol are just a few of the chemicals found in laundry detergent and additives. Some studies reported that toxic chemicals found in every home are three times more likely to cause cancer than airborne pollutants.

A scientific paper presented by a Vancouver consulting firm at the Indoor Air conference of 1990 in Toronto reported that, because of household cleaners and additives, children of housewives have a 55% higher risk of getting cancer than do children of women who work outside the home. Dr. Sherry Rogers, a practitioner of environmental medicine, author of environmental medicine, says that young children live dangerously. Playing on the floor exposes them to asbestos, formaldehyde and others, and wearing clothes contaminated as household additives and household cleaners. Children also have higher respiratory rates than adults do, they inhale three times the amount of



contaminates. But, because their detox systems aren't fully developed, they can't filter toxins as adults do. We are just beginning to see how toxins in children's lives are taking a toll. We have a higher rate of children with cancer and learning disabilities than ever before. If that does not say we're doing something wrong in the environment then whatdoes[22,23].

Indoor air pollution is a suspected culprit in SIDS (Sudden Infant Death Syndrome), which will take about 5,000 lives this year. The incidence of SIDS is higher in the winter, perhaps because of decreased ventilation in the cold months. It is no coincidence that SIDS was only recognized after the introduction of synthetic chemicals, according to Nancy Green Sokol, the author of Poisoning Our Children (Noble Press 1991). Other behavior and health disorders caused by chemicals in our home include coughing, wheezing, nasal congestion, burning eyes, headache, burning, tingling and flushing of the skin, muscles aches, irritability, mental confusion, lack of coordination and hyperactivity... according to William Rea, MD. Of Dallas, past president of the American Academy of Environmental Medicine. these products particularly insidious is the fact that billions of dollars are spent every year to convince us through advertising that they are necessary and will enhance our lives, when in fact, many of these products are poising us [19].

IV MATERIALS AND METHODS

A randomized sample to 159 mothers of children between the age 2-8 years, from different socioeconomic classes, submitted to questionnaires to collect information about some important items and tasks:

- Maternal use of some additives in washing clothes as Bleach and Fabric softeners.
- Relation between dermatitis in children and additives products which use in washing their clothes.
- Most additive's types to cause dermatitis in children
- Effects of additives on fabric textile
- To how extend mothers follow instructions written on any additives or on clothes
- Predisposing and the obvious causes for dermatitis in children
- The most common areas in the body and symptoms of dermatitis

By using t-test and other multivariate logistic regression analysis, we found correlation between chemical additives and dermatitis.

V RESULTS AND DISCUSSION

From table (1) we identify the different socioeconomic levels of mothers in the community sample in the study

	1	Mother's	r's age(years) Child's age(years)			Level of maternal education			Family economic income(S.R.)								
Data	20 ★	21- 25	26- 30	↑ 30	♦ 2y	2-4	4-6	6-8	ignorant	low	Mid.	High	↓ 2000	2001- 4000	4001- 6000	6002- 8000	♦ 8000
percentage	1.25	18.86	32.7	47.17	17.61	28.3	15.09	19.5	14.46	13.84	20.76	50.31	19.5	24.53	24.53	17.61	13.84

Table 1: identification of the sample community.

Maternal use of some additives in washing clothes as Bleach and Fabric softeners:

Table (2) and Fig (1) showed that 62.3% of the sample use bleaches regularly in washing and laundering, 20, 7% infrequently for some times. 57.2% use softeners regularly with each wash, and only 23, 9% used them infrequently .Those mothers do not recognize any relation between dermatitis and additives. There is a great association between textures and dermatitis in children. Many factors considered as predisposing factors for coursing this association [23]. The exact incidence of textile contact dermatitis is unknown, but recent studies demonstrate that contact dermatitis produced by allergic or irritant reactions to clothing is more frequent than previously thought[21, 22] It also has been shown that the frequency of textile-dye allergy is increasing[24, 25].

Additives	Regular use		Infrequent use		No use		No comments		total
	frequency	%	frequency	%	frequency	%	frequency	%	
Bleach	99	62.3	33		15	9.43	12	7.55	147
Fabric softeners	91	57.2	38		14	8.8	16	10.1	143
Others	4	2.57	-				155	97.5	4

Table ((2):	Maternal	additive's	use
I abic y	41.	Matter	auditives	usu



Some Mothers prefer to use additives in washing results to the high efficiency of cleaning, bleaches fabrics, and the fabrics textures with softeners especially in children clothes are very important to them .Table (3) shows 50.31% use additives regularly while the other infrequently use them irregularly. In a previous study, synthetic clothes free from additives were compared to cotton ones. In cases of unexplained dermatitis over the trunk, patients were generally advised to wear only cotton clothes and avoid synthetic ones. Although synthetic clothes do not absorb sweat and are uncomfortable in summer, the study had proven that they are free from additive allergens and were safe in allergic individuals. Patients who are allergic to additives allergens should avoid clothing and blended fabrics (polyester/cotton).

periods	frequency	percentage
each wash	80	50.31
Once/ month	24	15.09
Others infrequent	53	33.33
No comments	2	1.25
total	157	98.74

Table (3): Maternal period's additives use



There is a strong relationship between maternal education level and the use of additives in children clothes as noticed in table (4) .This can be referred to maternal desire to have quick and good results at the same time, as most of them are working women.

Additives		Bleach us	se		Softeners use				
Factors	Mean deference	erence St. dev. Mean def.		P-value	lean deference	St. dev. Mean def.	t-test	P-value	
Educational level	0.5166	1.4729	4.144	< 0.01*	0.5495	1.2824	5.021	< 0.01*	
Income	0.246	1.4181	1.919	0.057	0.2279	1.4904	2.076	0.040 **	

Table (4): Maternal education level and the use of additives

In addition, there is a significant co-relation maternal education level and the maternal use of additives in children clothes, and the effect of additives in causing dermatitis in children table (4).

Relation between dermatitis in children and cleaning and additives products which use in washing their clothes:

Table (5) and Fig. (2) Showed .63% of mothers were sure that additives has relation with dermatitis .52.8 % were not so sure of the relation .42.1% reported very little relation. This is clear that most of the members of the study not so sure of the relation between dermatitis and additives in washing children clothes.

Information about dermatitis	Sure		not so sure		little		Not at all		total
related additives	frequency	%	frequency	%	frequency	%	frequency	%	
Additives	1	.63	84	52.8	67	42.1	5	3.14	157

Table (5): maternal information about dermatitis-related additives



This explain why most mothers prefer to use additives, in spite of their educational level, and information about dermatitis related additives, as demonstrated in table (5).on the other hand this majority is not quiet sure and not insight of the relation between dermatitis and additives in children. More over the rapid effects of additives on clothes whether softening or bleaching are not considering that dermatitis so dangerous. Which is not true? More

important is the remote effects of rapped dermatitis on skin as one of the predisposing pre-cancerous factor for cancer skin.

Most additive's types to cause dermatitis in children:

Table (6) and Fig.(3) show the most affective additives on child dermis .36.5% of mothers think that bleaches were the commonest additive to cause child's skin dermatitis .32.1% were detergents them selves. And at least were softeners 8.8%.

Many research woks reported that using Bleach in washing cotton clothes has negative effects on the texture of clothes. As clothes become more harder and more tough due to the appearance of very fine and tiny hard fibers on the surface of the textile. the continues friction causes dermatitis [18] .This comes with our results from table (12) that most of the effects of especially in cotton clothes the torn of weak areas in the fabrics or more roughness of the textile materials of the fabrics.

Washing products	frequency	percentage
detergents	51	32.1
bleach	58	36.5
Fabric softeners	14	8.8
others	0	0
No comment	36	22.6
total	123	77.35

Table (6): maternal information about type of additives related dermatitis



Table (7) shows causes leading to change types of washing products, 13.8% of mothers change the type due to dermatitis 67.9 % changed for better cleaning effects.



Factors to change	Yes		sometime	sometimes		non		No comments	
washing products	Frequency	%	frequency	%	frequency	%	frequency	%	
dermatitis	22		31		64	40.3	42	26.4	117
cheaper	10	6.2	51		55	34.6	43	27	116
available	59	37.1	28	17.6	32	20.1	40	25.2	119
Better cleaning effects	108	67.9	18	11.3	9	5.66	24	15.1	135

 Table (7): causes to change washing products

Table (8) and fig.(4),(5) showed that Clorox is the commonest bleach used in mothers for all clothes and not only in children 83%, while 14.4 prefer finish as the best type of bleach and the rest percent distributed on other types. Tera noticed that cotton seeds in the textile affects weight, thickness and atmosphere permeability which increases sweating ,and with more children activities and decrease the ability of evaporation from the inter-textile spaces .so the dermis react with salts sweat and dermatitis results[2].

Table (8): commoner bleach used

Bleach type	Yes		sometimes		non		No comments		total
	Frequency	%	frequency	%	frequency	%	frequency	%	
Clorox	132	83	16	10.1	4	2.52	7	4.4	152
Finish	23	14.4	42	26.4	62	38.9	32	20.1	127
Others	4	2.52	-	-	-	-	155	97.5	4



On the other hand fig.(6,7,8,9):and table (9) show that, the commonest fabric softeners used by mothers in the sample was downy 57.2%, then comfort in the second position as 56.6%, while the rest of the percent other types. This depends on the advertisements most probably.



Bleach type	Yes		sometimes		non		No comments		total
	Frequency	%	frequency	%	frequency	%	frequency	%	
comfort	90	56.6	25	15.7	30	18.8	14	8.8	145
Nolan	16	10.1	35	22	78	49.1	30	18.9	129
downy	91	57.2	29	18.2	23	14.4	16	10.4	143
Moby	23	14.4	39	24.5	65	40.9	32	20.1	127
others	2	1.25	-	-	-	-	157	98.7	2

 Table (9): commoner fabric softeners used







* Effects of additives on textile fabrics: effects of bleach on the nature of fabric texture

It is well known and obvious that repeating wash with bleaches hardens and makes the fabric more rough and tough even torn in some weak areas. This was clear from table (10) and fig.(10-11-12) 45.3% reported the roughness of the fabrics , while the other 35.2% had reported that clothes were torn in some parts of the fabrics.

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Bleach effects	Yes		sometimes		non		No comments		total
	Frequency	%	frequency	%	frequency	%	frequency	%	
Roughness	72	45.3	48	30.2	19	11.9	20	12.6	139
Torn of fabrics	56	35.2	50	31.4	37	23.3	16	10.1	143
others	4	2.52	1	0.63	-	-	154	96.8	5

Table (10): Bleach effects on fabrics





Dermatitis may result from the rough clothes of children, and the friction of dermis with thses clothes resulted in redness of the skin (erythema) end as contact textile dermatitis.

* To how extend do mothers follow instructions written on any additives or on clothes

Table (11) showed 32.7% of mothers in the sample do not follow directions on the additives before the use, while 47.8% sometimes follow the instructions before using any detergent, bleach or softeners.

Direction of use	Yes		sometimes		non		No comments		total
	Frequency	%	frequency		frequency	%	frequency	%	
ollow the instructions	30	18.8	76		52	32.7	1	.,63	156

Table (11) the	e role of Follow	the instructions
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Table (11) explain that the type of additives used can affect the dermis and dermatitis the commonest fabric softeners used by mothers was comfort 57.2% then downy in the second position as 56.6%, while the rest of the

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Others recommended that odorless detergents is better used in washing process of clothes as this has a negative effects on dermis health ,and may cause allergy and dermatitis in some persons[27].

There is no relation between education level and the following of directions. Although we thought that the higher level of education must be more follows of instructions .Which may increase the rate of dermatitis. table (12), on the other hand Kashkary had confirmed that the type of soup used in washing the underwear had great effect on causing dermatitis in 62% and this percent is increasing more and more in illiterate women , not knowing the best types of soups and Detergents[27]. This comes with contrary to our results form table (12) that explains the level of education does not affect the following of directions and instructions of additives use which showed low significant.

Response	Follow instructions			
factor	Mean deference	St. dev. Mean def.	t-test	P-value
Educational level	1.2283	1.2563	12.285	0.01>

Table (12) Relation between education level and following of the instructions

Table (13) and fig.(13) showed the most common sites and distribution of dermatitis in children. It is noticed that 38.4 % of dermatitis occur in skin folds, 37.7% between thighs, and 14.5% is axillary's. Table (13) showed the most common sites and distribution of dermatitis in children. This is in the contrary to the distribution of dermatitis in adults, which are heights in the axella. This is explained by the design of children's wears, where the axillary and thigh areas are exposed more for air, so less sweat is accumulated and better evaporation from this area. While skin folds keep and accumulate sweat and salts that increase the incidence of dermatitis .This problem is noticed more in artificial fibers [28].

This comes in agreement with others who found that erythematous patches with or without other symptoms are a common form of textile dermatitis. Usually these lesions develop at sites where the garments fit tightly, such as inner and posterior thighs, popliteal fossae, buttocks, waistband area, and anterior and posterior axillary folds, sparing the vault. Textile dermatitis can also assume other clinical appearances that are atypical and thus delay the correct diagnosis of CD produced by clothing [28].

	dermatitis		Some times		No dermatitis	
Affected area						
	Frequency	percent	Frequency	percent	frequency	percent
Skin folds	61	38.4	24	15.1	54	33.9
Axilla	23	14.5	25	15.7	84	52.8
Thighs	44	37.7	19	11.9	79	49.7

Table (13): Common areas for dermatitis in children

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ptoms of dermatitis	dermatitis		Some times		No dermatitis	
	Frequenc	percent	Frequenc	percent	frequency	percent
Erythema	69	43.4	25	15.7	44	27.6
Erythema & itching	82	51.6	28	17.6	33	20.7
Erythema &pain	35	22	29	18.2	63	45.9
Skin scratches	48	30.2	27	16.9	66	41.5
skin oedema	19	11.9	21	13.2	95	59.7

 Table (14): Symptoms of dermatitis in children

In Table (14) and fig. (14) Symptoms of dermatitis in children, resulting from wearing special types of materials were noticed. 51.6% in the form of erythema and itching, 30.2% had skin scratches; those results come in agree with other studies, which reported that patients with allergic textile contact dermatitis demonstrate the atypical and unusual clinical presentations of allergic contact dermatitis to clothing. Being familiar with the typical and unusual forms of textile contact dermatitis allows more rapid and precise diagnosis of clothing-related, contact dermatitis [29].



Overall, most physicians know little or nothing about environmental medicine, unless they have specifically studied the relationship between sickness and the toxins in our environment.

Exposure to toxic chemicals can aggravate symptoms of allergy and compromise the immune system to the point where disabling sensitivity to certain chemicals develops. Over a long period, toxic products can contribute to development of cancer, birth defects, genetic changes and illnesses. Some estimates suggest that the costs of what is now called pollution exceeds 6 billion per year, more than 1 billion in medical bills and 5 billion from sick leave and reduced productivity in the U.S. Every year 5 to 10 million household poisonings are reported. Many are fatal, and most of the victims are children [19].

VI CONCLUSIONS AND RECOMMENDATIONS

Many studies recommended that clothes should be washed many times before wearing to reduce the level of free allergen[20] other studies reported that if children clothes did not washed perfectly with water remnant of Detergents has a great role in cussing dermatitis, So especially children clothes had to be washed thoroughly with water from all soup or detergents precipitates, other wise they may dissolve with sweat causing dermatitis. This was recommended also in other studies to run clothes through an extra rinse cycle to prevent dermatitis in children [30]. Our results indicated that there is a strong relation between washing detergents, chemicals additives and dermatitis in children.. This conclusion was strengthened by statistical analysis of results. Not only additives can affect dermis of children but also detergents. Nowadays both are mixed as one product, which has double effect in causing extensive dermatitis. Not forgetting the use of children clothes in everywhere, home-schools-hospitalsand all the time whether natural or synthetic .Clothes should be treated as possible as can with special care to gain good health of dermis especially in children. Some points had to be in mind:

- Maternal programs and counseling about clothes hygiene and dermis health.
- Raise health awareness of people for dermatitis.
- Use natural softeners as vinegar instead of the artificial ones to decrease the percent of dermatitis.
- Increase the role of advertisements in raising the awareness of the problems in people and mainly mothers.
- Diminish the use of additives mainly for the under-wears of children.
- After using detergents in children washing try to increase the times of resin with water
- Hospitals had to use disposable dressings for operation instead of sterilization and washing them with chemicals to decrease the incidence of dermatitis especially, major long operation times.
- Wear loose clothing, preferably cotton especially if new.
- Avoid wearing synthetics and scratchy fabrics specially if cleaned many times with additives. Permanentpress and wrinkle-resistant clothes may contain formaldehyde and other irritating chemicals
- Wash all clothing with mild, unscented detergents, such as those recommended for infant clothing. Avoid using bleaches, fabric softeners, and other additives.
- Wash new clothing and towels before use.

You may be able to dramatically reduce your use of fabric softener and still get the desired effect. One person reports she puts a dab of liquid softener on a damp washcloth, places it in her dryer and reuses the same washcloth for many loads without adding more softener. One bottle of softener lasts her years. Another natural less toxic and

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less harmful method is to Add 1/2 cup of white vinegar, baking soda OR borax to the rinse cycle to soften water and reduce static cling[17].

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