

**Analysis of Phthalate Concentrations in
Coconut Oil Available in the Sri Lankan
Market**

By

Koku Hennadige Priyamali Dharmakantha

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Science and Technology on 2015.**

DECLARATION

The work described in this thesis was carried out by me under the supervision of Dr. (Mrs.) Indira Wickramasinghe, Department of Food Science and Technology, Faculty of Applied Sciences, University of Sri Jayewardenepura, and a report on this has not been submitted in whole or in part to any university or any other institution for another Degree.

08/12/2015

.....
Date

Sriyemdi

.....
K. H. P. Dharmakantha

DECLARATION

I, Dr. (Mrs.) Indira Wickramasinghe, certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the University for the purpose of evaluation.



.....

Dr. (Mrs.) Indira Wickramasinghe

8/12/2015
.....

Date


Department Head,

Department of Food Science and Technology,

University of Sri Jayewardenepura,

Nugegoda,

Sri Lanka.



**AFFECTIONATELY
DEDICATED
TO
MY LOVING PARENTS,
BROTHER
AND
DEAR TEACHERS**

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ABBREVIATIONS

°C	- Celsius
°F	- Fahrenheit
BBP	- Benzylbutyl phthalate
BMR	- Basal Metabolic Rate
DBP	- Dibutyl phthalate
DEHP	- Diethylhexyl phthalate
DIDP	- Diisodecyl phthalate
DINP	- Diisononyl phthalate
DnOP	- Di-n-octyl phthalate
EC	- European Commission
EFSA	- European Food Safety Authority
EU	- European Union
FAO	- Food and Agriculture Organization
g	- gram
GC-MSD	- Gas Chromatography - Mass Spectrometric Detector
kg	- kilogram
l	- liter
mg	- milligram
ml	- milliliter
ND	- Not Detected
PAL	- Physical Activity Level
SML	- Specific Migration Limit
TDI	- Tolerable Daily intake
UNU	- United Nations University
WHO	- World Health Organization

**Analysis of Phthalate Concentrations in Coconut Oil Available in the
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By

Dharmakantha K. H. P.

ABSTRACT

The main objective of this study was to determine the concentration of some selected Phthalates; DBP, BBP, DEHP, DnOP, DINP and DIDP in Coconut oil found in the Sri Lankan market. Phthalate concentrations were also compared with the values from the international standards for food and human health. The Coconut oil samples were collected from two retail shops and four brands which were in bottles or packets, taken from a convenience store.

Statistically it was identified that the DEHP levels detected are dependent on the brands or for retail samples, on the shop it was taken from. DEHP was detected in all the samples taken from the retail shops, and two brands contained in bottles. Other two bottled and packaged coconut oil samples did not contain DEHP. In the detected samples all DEHP concentrations were above the Specific Migration Limits (SML) which is 1.5 mg/kg established by EU standards (EU,2007), but all samples except for retail shop B samples will not exceed the Tolerable daily intake (TDI) value for DEHP by consuming, which is 0.05 mg/kg bodyweight/day as specified by the European Food Safety Authority (EFSA,2005).

But with increased uptake of coconut oil as the fat source, due to increased energy requirement and relatively low bodyweight retail shop B samples can exceed the TDI value which may pose a risk to health of those consumed.

DBP, BBP, DnOP, DINP and DIDP were not detected in any of the samples taken for analysis in this research, due to this DBP, BBP, DINP and DIDP levels of these samples were below the SML, and the TDI values will not be exceeded by consuming.

CHAPTER 01

INTRODUCTION

Coconut oil is an edible oil extracted from the kernel or meat of mature coconuts harvested from the coconut palm (*Cocos nucifera*). It has various applications in food industry. Coconut oil is commonly used in cooking, especially for frying, and is a common flavor in many South Asian curries. In recent years despite its high saturated fat content, virgin coconut oil has become popular, which works well in baked goods, pastries, and sautés.

Domestic requirement of coconut oil is between 130,000 – 150,000 metric tons and around 65,000 to 80,000 metric tons are produced domestically.

Phthalates, or phthalate esters, are esters of phthalic acid and are mainly used as plasticizers (substances added to plastics to increase their flexibility, transparency, durability, and longevity).

Phthalates are used in a wide range of common products, and are released into the environment. There is no covalent bond between the phthalates and plastics; rather, they are entangled within the plastic as a result of the manufacturing process used to make PVC articles. They can be removed by exposure to heat or with organic solvents. However, people are exposed to phthalates, and most Americans tested by the Centers for Disease Control and Prevention have metabolites of multiple phthalates in their urine. Phthalate exposure may be through direct use or by indirect means through leaching and general environmental contamination. Diet is believed to be the main source of di(2-ethylhexyl) phthalate (DEHP) and other phthalates in the general