

# Coconut Oil for Improving Oral Health of Autistic Children

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## ABSTRACT

This study was designed to evaluate the effectiveness of coconut oil used in the oral health of autistic children. Sixty autistic children aged 3-5 years were involved in the study. Children randomly divided into two groups: 1<sup>st</sup> group brushes their teeth with coconut oil and the 2<sup>nd</sup> group used fluoridated toothpaste. The dmft (decayed, missing, filled tooth) index and debris index were measured in the first day as baseline data then after intervals of 2 weeks, 4 weeks, 3 months and 6 months. At the baseline visit, dmft coconut oil group was (9.910 ± 0.08) while for toothpaste group was (8.430 ± 0.09). After 6 months, dmft coconut oil group was (9.910 ± 0.02) while for toothpaste group was (12.101 ± 0.07). At baseline and 2 weeks visits, most of children judged to have poor oral hygiene level. At 3 and 6 months visits, frequency of coconut oil children showed good oral hygiene continue to be increased significantly while children using toothpaste showed highest level at fair oral hygiene.

**Key words:** Coconut oil, Autism, Oral, Hygiene

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## INTRODUCTION

The important part of the coconut tree is the coconut fruit, which is considered as “a functional food”. Coconut fruit consists of three layers: the exocarp “outer layer”, the mesocarp “fleshy, middle layer”, and the endocarp “hard, woody layer that surrounds the seed” [1]. Coconut oil is richest sources of saturated fat. It is composed of approximately 90% saturated fatty acids [2]. However, coconut fat is unique because it is made of medium-chain triglycerides which are metabolized differently than the long-chain fatty acids found in most other foods. Lauric acid is a medium-chain fatty acid that makes up almost 50% of coconut oil. According to research, lauric acid is more effective in killing specific oral pathogens such as *E. coli* and *Candida* spp. than any other saturated fatty acid [3]. Oil pulling is an ancient procedure in Ayurveda, which involved swishing oil in the mouth for oral health and systemic health benefits. Oil pulling has been used extensively in India for many years to prevent decay, bleeding gums, oral malodour, and dryness of throat, cracked lips and for strengthening teeth, gums, and jaws. This process involves swishing a tablespoon of coconut oil in the mouth for 20 minutes. The oil with the bacterial contents is spit out, and the patient is advised to brush normally [4].

Autism Spectrum Disorder is a “developmental disability due to certain differences in the brain that can be according to many researches treated with diet and support” [5]. Dietary strategies based on short and medium chain saturated fatty acids can manage, cure and even prevent autism. These are mainly found in breast milk, coconut oil and palm kernel oil [6].

This study was designed to evaluate the effectiveness of coconut oil used to brush the teeth on the oral health of autistic children aged 3-5 years old.

## MATERIALS AND METHODS

Sixty autistic children of both genders, aged 3-5 years were involved in this study that was referred to the Private Pediatric Dentistry Center in Baghdad, Iraq (between March to October, 2016). All children included had been previously diagnosed with autism. Full detailed treatment plan was explained to the children's parents and written consents were obtained for including the children in this study.

The study is approved by an ethical committee of Ibn Sina University of Medical and Pharmaceutical Sciences, Iraq. Complete general information was obtained and recorded in case sheet (Case Sheet 1-3).

The autistic children were not on any medications at the time and had no history of drug allergies; exclude those suffering from other systemic diseases. All the work was carried out by the same dentist.

**Case Sheet 1: Case sheet information**

Case No:	.....	
Group:	<input type="checkbox"/> Coconut	<input type="checkbox"/> Toothpaste
Patient's Name: .....	Age: .....	Gender: .....
Parent's Phone No:	.....	
Address:	.....	
Chief complaint:	.....	
Medical history:	.....	
Dental history:	.....	

**Case Sheet 2: DMFT**

Teeth	1 <sup>st</sup> (baseline)	2 Weeks	4 Weeks	3 Months	6 Months
55	-	-	-	-	-
54	-	-	-	-	-
53	-	-	-	-	-
52	-	-	-	-	-
51	-	-	-	-	-
61	-	-	-	-	-
62	-	-	-	-	-
63	-	-	-	-	-
64	-	-	-	-	-
65	-	-	-	-	-
75	-	-	-	-	-
74	-	-	-	-	-
73	-	-	-	-	-
72	-	-	-	-	-
71	-	-	-	-	-
81	-	-	-	-	-
82	-	-	-	-	-
83	-	-	-	-	-
84	-	-	-	-	-
85	-	-	-	-	-
Total	-	-	-	-	-

**Case Sheet 3: Debris index of the simplified oral hygiene index**

Surface	Teeth	1 <sup>st</sup> (baseline)	2 Weeks	4 Weeks	3 Months	6 Months
Labial	54	-	-	-	-	-
	61	-	-	-	-	-
	82	-	-	-	-	-
Lingual	75	-	-	-	-	-

The autistic children were randomly divided into two groups (30 children in each). 1<sup>st</sup> group children brushed their teeth with coconut oil (Pure Natural Sri Lankan, Hemani International KEPZ, Karachi, Pakistan) (Figure 1)

and 2<sup>nd</sup> group children brushed their teeth with using fluoridated toothpaste (Ken, Spain). The teeth brushing were done at home twice a day under supervision of parent. Thorough instructions was given to the parent

about how to damp tooth brush tufts into the coconut oil and brush all the child teeth for 0.5-1 minute. For both groups, important information was given to parent about how he/she should sing a silly song, smile and laugh along with while brushing teeth. The process is thus made fun and things are done rather hassle-free. They were instructed to take things slow; there is no need to rush through the process as an autistic child requires more time than a normal child when learning to deal with something that might be bothering them terribly.



**Figure 1: Coconut oil used in this study (Pure Natural Sri Lankan, Hemani International KEPZ, Karachi, Pakistan)**

The dmft (decayed, missing, filled tooth) index and debris indices of the Simplified Oral Hygiene Index were

measured in the first day as baseline data then after intervals of 2 weeks, 4 weeks, 3 months and 6 months. The dmft index was with codes and criteria established by the WHO (1997) [7]. The Oral hygiene was recorded according to debris index of the Simplified Oral Hygiene Index [8] that also determined the teeth selected: (the labial surfaces of the 54, 61, 82 and the lingual surface of 75). Calculus was excluded. Table 1 demonstrated the criteria for classifying debris. Debris Index=(The buccal scores)+(The lingual scores)/(Total number of examined buccal and lingual surfaces). Furthermore, to give clinical relevance to the index, the oral cleanliness was considered. The average in between 0.0 to 0.6 represents a good oral hygiene, while, range between 0.7 to 1.8 shows a fair oral hygiene and 1.9 to 3.0 a poor oral hygiene.

The data was described using frequencies and percentages for categorical variables. When the outcome variables were categorical, Chi-Square test was used to examine differences between frequencies and t-test was used to compare between means for statistical significance. Data were analysed using SPSS software, version 16.0 (SPSS Inc., Chicago, IL, USA) for Windows. Statistical significance was set at  $p \leq 0.05$ .

**Table 1: The dmft index of children in the first visit, 2 weeks, 4 weeks, 3 months and 6 months visits**

Group	dmft index	1 <sup>st</sup> (baseline) (Mean)	2 Weeks (Mean)	4 Weeks (Mean)	3 Months (Mean)	6 Months (Mean)	t-test (p value)
Coconut oil Group (no. 30)	dmft	9.91	9.91	9.91	9.91	9.91	0.000 (1.000)
	dt	8.01	4.01	0	0	0	3.268 (0.022)*
	mt	0	0	3.01	3.01	3.01	2.331 (0.102)
	ft	1.1	5.1	6.9	6.9	6.9	3.596 (0.016)*
Toothpaste Group (no. 30)	dmft	8.43	8.43	8.43	10.587	12.101	2.28 (0.170)
	dt	8.1	6.01	0	1.053	1.081	4.112 (0.010)*
	mt	0.03	1.12	1.12	1.12	1.12	1.929 (0.150)
	ft	0.3	2.3	8.31	9.5	10	4.324 (0.010*)

(\*)  $p \leq 0.05$ =Statically significant difference

**RESULTS**

Sixty autistic children of both genders were included in this study. The mean age of children was 4.2 years (ranges 3 years to 5 years). Table 2 demonstrated the distribution of autistic children classified according to age and gender. The total sample represents 40 male and

20 female autistic children with statistically significant difference ( $p \leq 0.05$ ). The samples were randomly divided into two groups; Group 1: Coconut oil group included 30 children and Group 2: Toothpaste group included 30 children.

**Table 2: Distribution of autistic children classified according to age and gender**

Age (years)	Gender		Total No. (%)	(P value)
	Male No. (%)	Female No. (%)		
3-4	18 (45)	8 (40)	26 (43.3)	0.987
4-5	22 (55)	12 (60)	34 (56.7)	1.212

Total	40 (66.7)	20 (33.3)	60 (100)	0.031*
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(\*) p ≤ 0.05=Statically significant difference.

Table 1 demonstrated the dmft index at subsequent dental visits of children using coconut oil and toothpaste. At the 1<sup>st</sup> visit, the dmft (mean ± SD) for coconut oil group children was 9.910 ± 0.08 while for toothpaste group was 8.430 ± 0.09, with no significant difference between the groups at p>0.05. The dt was the highest component of dmft in both groups. Meanwhile, in both groups, from 2 weeks dental visit and later on, as the dental therapeutic procedures were carried out, results showed a significant decrease in the dt component and significant increase in the ft and insignificantly increased mt component. At 4<sup>th</sup> week visit, in both groups, the dt component was 0.000. In coconut oil group, the dt continued to be 0.000 at visit in 3<sup>rd</sup> month and 6<sup>th</sup> month which indicated no new caries lesion occurred later on. Meanwhile, in toothpaste group, at 3<sup>rd</sup> and 6<sup>th</sup> months dental visits, new caries lesions were recorded. Figure 2 illustrated the oral hygiene of autistic children at different visits recall. At 1<sup>st</sup> and 2<sup>nd</sup> weeks visits, most of children of both groups judged to have poor oral hygiene level. However in 4<sup>th</sup> week visit, the improvement in oral hygiene in coconut oil and toothpaste groups reached a significant level at p ≤ 0.05 (p=0.023 and 0.028 respectively). At 4<sup>th</sup> week, in coconut oil group, the frequency of children that developed good oral hygiene increased, meanwhile most of children of toothpaste group reached a fair level oral hygiene. At 3<sup>rd</sup> and 6<sup>th</sup> month recall visits, the frequency of coconut oil group children continued to be increase significantly towards good oral hygiene (p=0.009 and 0.011). In toothpaste group, at 3<sup>rd</sup> and 6<sup>th</sup> month recall visits, the frequency of children showed significant highest level at fair oral hygiene (p=0.016 and 0.041).

Concerning the dmft index at different dental visits of children using coconut oil and toothpaste, during the 1<sup>st</sup> visit, no significant difference between the groups was reported which is in agreement with the study done by Lowe et al. [10] who reported that children with autism are considered to have high risk of caries. In contrast, Loo et al. [11] study stated that through logistic regression analysis it was determined that patients with autism were 70.5% less likely to have a positive caries history than the control group.

In coconut oil group, at 3<sup>rd</sup> month and 6<sup>th</sup> month there were no new caries lesion developed later on, which is in agreement with study by Siri et al. [12] who stated that in addition coconut oil had essential role in increasing immunity and aids with digestion, it has action which creates a negative pressure in the oral cavity, the pressure of brushing and the viscosity of the oil aid in pulling away food particles and microorganisms that may be present on the tooth and gingival surfaces.

Meanwhile, in toothpaste group, at 3<sup>rd</sup> and 6<sup>th</sup> months dental visits, new caries lesions were recorded. This indicated that use of only mechanical teeth brushing is insufficient for removal of dental plaque which is in agreement with study by Ferreira et al. [13], who stated that ineffective dental plaque removal has been responsible to cause demineralization, caries and gingivitis. Meanwhile, this is in contrary with Gallagher et al. [14] study who stated that toothpaste is not needed nor is toothpaste a big factor in eliminating plaque. Also, Tomaszewsk [15] concentrated that increasing the time spent brushing without adding dental toothpaste will effectively remove plaque.

Designer Kosho Ueshima collaborated with Japanese Technology Company and created an incredible toothbrush that uses nanotechnology to clean the teeth without using toothpaste. The brush's bristles about 0.178 mm thick and coated with mineral ions and when the brush passed over the teeth, the ions remove stains and form a protective coating over the enamel. To activate the brush, it should be dipped in a cup of water. Those tooth brushes were found to be effective for children with special dental health need, but the disadvantages only they are not yet widely marketed because of the high cost of these tooth brushes [16].

In this study, the significant improvement in oral hygiene was found in coconut oil group children, which agrees with many other authors who published the great effectiveness of coconut oil in improving oral health. Tomar et al. [17] stated that "various oils used for swishing the oral cavity include: Coconut oil, corn oil, rice bran oil, palm oil, sesame oil, sunflower oil, and soybean oil". Even oil pulling is effective in improving oral health but none of them considered to be replacement for the tooth brushing, but can definitely be a supplemental oral

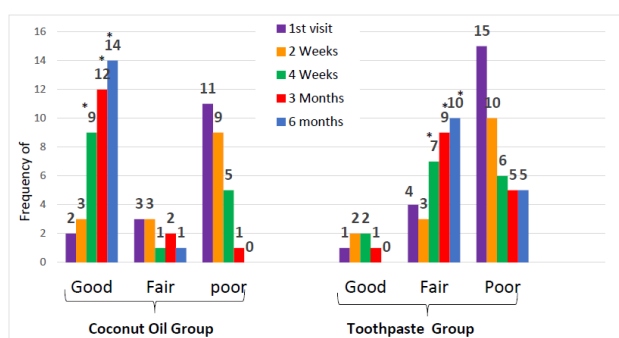


Figure 2: The Oral hygiene was recorded according to debris index of the Simplified Oral Hygiene Index for coconut oil and toothpaste groups children at different dental visits (\*p ≤ 0.05=statically significant difference)

DISCUSSION

In this study, the total samples represented by 40 male and 20 female autistic children with statistically significant difference, agreed with Fombonne [9] who stated that autism disorder is a male dominated condition.

hygiene aid. In this study coconut oil seem to be effective in improving oral hygiene of autistic children because autistic children are just a little bit harder to work with as a parent, with brushing teeth one of the top problems on the list. Children with autism are hypersensitive, feeling things more thoroughly than the typically developing child.

The predominant composition of coconut oil is a medium chain fatty acid, whereas the majority of common edible fats in our diet are composed almost entirely of long chain fatty acids. Thaweboon et al. [18] used coconut oil, corn oil, rice bran oil, palm oil, sesame oil, sunflower oil and soybean oil and found that coconut oil strongly inhibits the growth of most strains of *Streptococcus* bacteria, including symptoms of *Streptococcus mutans* (acid-producing bacterium that is a major cause of tooth decay). Meanwhile, the results from many studies revealed that the monolaurin, the monoglycerides of lauric acid from coconut oil had antimicrobial activity against various Gram+ and Gram- organisms, including "*Escherichia vulneris*", "*Enterobacter* spp" [19], "*Helicobacter pylori*" [20], "*Staphylococcus aureus*" [21] and "*Candida* spp" [22].

However, they hypothesized that the antimicrobial actions of coconut oil may be related to monolaurin and other medium chain monoglycerides which have the capacity to alter bacterial cell walls, penetrate cell membranes, and inhibit enzymes involved in energy production eventually leading to the death of the bacteria [18].

### CONCLUSIONS

Children with autism are considered to have high risk of caries and need additional oral health care. This Study showed that coconut oil had significant improvement in oral health for autistic children, so, coconut oil could be considered as a supplemental oral hygiene aid for autistic children.

However the limitation of this study is that it is a small scale study with small numbers of participants.

### SCIENTIFIC COMMITTEE APPROVAL

All procedures performed in studies involving human participants were in accordance with the ethical standards of Ibn Sina University of Medical and Pharmaceutical Sciences, Iraq.

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### CONFLICT OF INTEREST

The author declared no potential conflicts of interests with respect to the authorship and/or publication of this paper.

### REFERENCES

1. Bourke RM, Harwood T. Food and agriculture in Papua New Guinea. ANU E Press 2009.
2. Dayrit CS, FPCP F. Coconut oil: Atherogenic or not? (What therefore causes atherosclerosis?). *Philipp J Cardiol* 2003; 31:97-104.
3. Kabara JJ, Swieczkowski DM, Conley AJ, et al. Fatty acids and derivatives as antimicrobial agents. *Antimicrob Agents Chemother* 1972; 2:23-8.
4. Asokan S, Emmadi P, Chamundeswari R. Effect of oil pulling on plaque induced gingivitis: A randomized, controlled, triple-blind study. *Indian J Dent Res* 2009; 20:47.
5. de Boer-Ott S, Griswold DE, Myles BS, et al. Autism spectrum disorders: Interventions and treatments for children and youth. Corwin Press 2004.
6. Nagao K, Yanagita T. Medium-chain fatty acids: Functional lipids for the prevention and treatment of the metabolic syndrome. *Pharmacol Res* 2010; 61:208-12.
7. World Health Organization. Oral health surveys basic methods. Geneva 1997; 41-4.
8. Greene JG, Vermillion JR. The simplified oral hygiene index. *J Am Dent Assoc* 1964; 68:7-13.
9. Fombonne E. The prevalence of autism. *JAMA* 2003; 289:87-9.
10. Lowe O, Lindemann R. Assessment of the autistic patient's dental needs and ability to undergo dental examination. *ASDC J Dent Child* 1985; 52:29-35.
11. Loo CY, Graham RM, Hughes CV. The caries experience and behavior of dental patients with autism spectrum disorder. *J Am Dent Assoc* 2008; 139:1518-24.
12. Siri K, Lyons T. Cutting-edge therapies for autism 2011-2012. Skyhorse Publishing Inc 2011.
13. Ferreira MA, Mendes NS. Factors associated with active white enamel lesions. *Int J Paediatr Dent* 2005; 15:327-34.
14. Gallagher A, Sowinski J, Bowman J, et al. The effect of brushing time and dentifrice on dental plaque removal in vivo. *J Am Dent Hyg Assoc* 2009; 83:111-6.
15. Tomaszewsk M. Will toothbrushing without toothpaste decrease overall plaque level? Thesis, O'Hehir University 2016.
16. [www.dezeen.com/2015/04/10/misoka-toothbrush-nanotech-ions-kosho-ueshima-yumeshokunin-milan-2015/](http://www.dezeen.com/2015/04/10/misoka-toothbrush-nanotech-ions-kosho-ueshima-yumeshokunin-milan-2015/)

17. Tomar P, Hongal S, Jain M, et al. Oil pulling and oral health: A review. *IJSS Case Rep Rev* 2014; 1:33-7.
18. Thaweboon S, Nakaparksin J, Thaweboon B. Effect of oil-pulling on oral microorganisms in biofilm models. *Asia J Public Health* 2011; 2:62-6.
19. Carpo BG, Verallo-Rowell VM, Kabara J. Novel antibacterial activity of monolaurin compared with conventional antibiotics against organisms from skin infections: An in vitro study. *J Drugs Dermatol* 2007; 6:991-8.
20. Bergsson G, Steingrímsson Ó, Thormar H. In vitro susceptibilities of *Neisseria gonorrhoeae* to fatty acids and monoglycerides. *Antimicrob. Agents Chemother* 1999; 43:2790-2.
21. Verallo-Rowell VM, Dillague KM, Syah-Tjundawan BS. Novel antibacterial and emollient effects of coconut and virgin olive oils in adult atopic dermatitis. *Dermatitis* 2008; 19:308-15.
22. Ogbolu DO, Oni AA, Daini OA, et al. In vitro antimicrobial properties of coconut oil on *Candida* species in Ibadan, Nigeria. *J Med Food* 2007; 10:384-7.