Pregnant Women's Knowledge and Consumption of Long-chain Omega-3 Polyunsaturated Fatty Acid Supplements

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Objectives: To examine the proportion of pregnant women who consumed long-chain omega-3 polyunsaturated fatty acids during pregnancy, and to assess their knowledge of the source and potential health benefits of these supplements.
Methods: An anonymous self-administered questionnaire on the use and knowledge of omega-3 fatty acids was distributed to all pregnant women in the first and third trimesters in the antenatal clinic in a regional hospital in Hong Kong between 1 May 2012 and 31 May 2012.
Results: A total of 254 questionnaires were received. Among those returned questionnaires including response to the use of omega-3 fatty acid, 14 (11%) and 15 (15%) women from the first- and third-trimester groups reported consumption of omega-3 fatty acids during the current pregnancy, respectively. The mean score for knowledge of omega-3 fatty acids for all participants was 7.9/12. For women who were taking omega-3 fatty acid supplements, those having completed tertiary education, a monthly income of >HK$30,000, and were Hong Kong residents had significantly better knowledge than the other groups. About 80% of the women would have to get more information on omega-3 fatty acids.
Conclusion: Although there is still a lack of evidence on the benefits of omega-3 fatty acids in pregnancy, about one eighth of pregnant women take these supplements despite having only fair understanding of omega-3 fatty acids. Further study is required to confirm the benefits of omega-3 fatty acids and better public education in this area is suggested. It is recommended that medical professionals provide more information on nutritional supplements to pregnant women.
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Keywords: Fatty acids, omega-3; Insurance benefits; Knowledge; Pregnant women

Introduction

Long-chain omega-3 polyunsaturated fatty acids are important nutrients for neurological and visual development[1,2]. Omega-3 fatty acids also have important roles in disease prevention and anti-inflammation[3]. Some authors have suggested that omega-3 fatty acids can reduce occurrences of preterm birth[4], perinatal depression[5], and pre-eclampsia[6,7], although further evidence is needed. Most of these benefits have been attributed to eicosapentaenoic acid and docosahexaenoic acid (DHA)[8,9]. The main dietary source of DHA is fish and seafood. In parallel with increasing public awareness of the potential health benefits of omega-3 fatty acids is the increasing availability of omega-3 fatty acid products in the Hong Kong market. However, the quality of the available omega-3 fatty acid products is varied. According to a local survey published in 2008[10], the DHA dosages quoted by the manufacturers varied from 60 mg/tablet to >350 mg/tablet, while the actual DHA content per tablet was just 36-379 mg/tablet. The recommended dosages from different manufacturers also varied from 100 mg/day to nearly 1000 mg/day[10].

There is no formal dietary recommendation on the use of omega-3 fatty acids. The National Health and Medical Research Council[11] has suggested consumption of 110 mg/day and 115 mg/day of DHA for pregnant women aged 14-18 years and 19-50 years, respectively. However, the International Society for the Study of Fatty Acids and Lipids[12] recommends consumption of 300 mg/daily for all pregnant women. This study aimed to examine the proportion of pregnant women who consumed omega-3 fatty acids during pregnancy, and to assess their knowledge on the source and potential health benefits of these supplements in terms of stage of pregnancy (first and third trimesters) and other variables to determine whether

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women of more advanced gestation had better knowledge of omega-3 fatty acids.

Methods

An anonymous self-administered questionnaire on the use and knowledge of omega-3 fatty acids was distributed to women in the first and third trimesters of pregnancy, who attended the antenatal clinic at the United Christian Hospital, Hong Kong between 1 May 2012 and 31 May 2012 (Appendix). All women who were between 13 and 28 weeks of gestation were excluded from the study. The women were encouraged to fill in the questionnaire while waiting for their consultation. Participation was voluntary and would not affect their antenatal care. Two versions, in traditional and simplified Chinese, were available. For consumption of omega-3 fatty acid supplements, participants were asked if they had ever consumed any products available from the market, at what week of gestation they started the supplements, and which brand they were taking. The reasons that they started taking the supplements, such as a recommendation from friends, health care professionals, or the media, were explored.

To assess the participants' knowledge of omega-3 fatty acids, seven food items (beef, sardine, rice, apple, egg, chicken, and salmon) were listed and the women were asked to identify those that were considered to be a main source of omega-3 fatty acids. Then, they were asked if there are any potential health benefits to the fetus regarding development of the brain, lungs, vision, hair, and cognitive functions[5,13,14]. Each correct answer scored 1 mark, and the highest score for this part was 12. Basic demographic information, such as age, marital status, education level, career and partner's career, family income, and residency in Hong Kong, was reviewed. Lastly, the women were asked if they would like more information on the use of these supplements in pregnancy. The study was approved by the Hospital Authority Research Ethics Committee, Hong Kong.

Data were coded and analysed by the Statistical Package for the Social Sciences Windows version 17.0 (SPSS Inc., Chicago [IL], US). Comparisons between the first- and third-trimester groups were performed using Chi-square analysis for categorical variables and Student's *t* test for unpaired data for continuous variables. A type I error of <0.05 was considered statistically significant.

Results

A total of 325 questionnaires were distributed and 254 questionnaires were received. The response rate was 78%. There were 147 (58%) questionnaires from women in their first trimester and 107 (42%) questionnaires from those in their third trimester. However, some data were missing as not all respondents answered all questions.

Participants' Characteristics

Most (58%, 135/232) of the women were aged between 31 and 40 years. Most were nulliparous (52%, 118/225) and married (96.1%, 223/232). Of those 232 women, 89 (38%) completed tertiary education, 140 (60%) completed secondary education, and three (1%) completed primary education. Most of the participants were housewives (47%, 100/215) followed by clerical workers (29%, 63/215). Among the partners, 36% (65/179) were clerical workers, 13% (24/179) were professionals, and 11% (19/179) were technicians. Besides, 29% (66/226) families had a monthly income of <HK$10,000, 56% (126/226) had HK$10,000-30,000, and 15% (34/226) had >HK$30,000. In all, 88% (169/193) of the participants were Hong Kong residents, and the remainder were travel permit holders from mainland China; 78.1% (132/169) of participants had been living in Hong Kong for >7 years (Table 1).

Proportion of Pregnant Women Consuming Omega-3 Fatty Acids

In all, 11% (14/129) and 15% (15/102) women from the first- and third-trimester groups reported consumption of omega-3 fatty acids during the current pregnancy, respectively. No specific factors were associated with the use of omega-3 fatty acids. No association was also identified between use of omega-3 fatty acids and parity, family income, education level, duration of Hong Kong residency, or stage of pregnancy (Table 2).

The main reasons for starting omega-3 fatty acid supplements were recommendations by friends and relatives (over 50% in both trimester groups), followed by the media such as magazines, the internet, or television. Only two (14%) women in the first trimester and one (7%) in the third trimester started omega-3 fatty acids after professional advice.

Among those women who had consumed omega-3 fatty acids, there were over 10 different brands of supplements with a daily intake ranging from 94 mg to over 750 mg when looked back into the actual content of omega-3 fatty acids of the tablets they took[10].

Knowledge of Pregnant Women of Omega-3 Fatty Acids

The mean score for all the participants on knowledge

Table 1. Demographic characteristics of the participants (n=254)*

Characteristic	Stage of pregnancy		p Value
	First trimester (n=147)	Third trimester (n=107)	
Age (years)			0.84
<20	2	3	
21-30	48	38	
31-40	77	58	
>40	4	2	
Marital status			0.49
Married	126	97	
Single	5	3	
Separated	0	1	
No. of pregnancies			0.04
1	68	41	
2	31	41	
3	16	13	
4	12	3	
5	1	2	
8	1	0	
No. of children			0.37
0	74	44	
1	42	40	
2	11	10	
3	2	1	
4	0	1	
Planned pregnancy			0.55
Yes	98	72	
No	33	29	
Usual place of antenatal checkup			<0.01
Public hospital	78	63	
Maternal child health centre	4	29	
Private doctor	2	3	
Both public hospital and private doctor	41	0	
Outside Hong Kong	6	5	
Education level			0.66
Primary	1	2	
Secondary	81	59	
Tertiary or above	49	40	
Occupation			0.15
Housewife	50	50	
Health care worker	1	0	
Professional	7	5	
Clerical	34	29	
Teacher	8	3	
Sales	10	3	
Other	12	3	
Husband's occupation			0.72
Professional	14	10	
Clerical	36	29	
Chef	6	5	
Driver	9	2	
Technician	12	7	
Manual worker	6	4	
Other	26	13	
Family monthly income (HK$)			<0.01
<10,000	23	43	
10,000-30,000	72	54	
>30,000	34	0	
Residency			0.06
Hong Kong resident	105	64	
Travelling permit from China	10	14	
Hong Kong residency >7 years			0.25
Yes	85	47	
No	20	17	

* Some data are missing as not all participants answered all of the questions

Table 2. Association of demographic characteristics with consumption of omega-3 fatty acid supplements*

Characteristic	Taken any omega-3 fatty acid supplements during this pregnancy?		p Value
	Yes (n=29)	No (n=225)	
Age (years)			0.87
<20	1	3	
21-30	11	74	
31-40	16	119	
>40	1	5	
Marital status			0.93
Married	28	193	
Single	1	7	
Separated	0	1	
No. of pregnancies			0.10
1	15	92	
2	5	67	
3	8	21	
4	1	14	
5	0	3	
8	0	1	
No. of children			0.36
0	18	98	
1	6	76	
2	4	17	
3	0	3	
4	0	1	
Planned pregnancy			0.60
Yes	20	148	
No	9	53	
Stage of pregnancy			0.38
First trimester	14	115	
Third trimester	15	87	
Usual place of antenatal checkup			0.45
Public hospital	21	118	
Maternal child health centre	4	29	
Private doctor	1	4	
Both public hospital and private doctor	3	38	
Outside Hong Kong	0	11	
Education level			0.45
Primary	0	3	
Secondary	15	123	
Tertiary or above	14	75	
Occupation			0.51
Housewife	16	83	
Health care worker	0	1	
Professional	0	12	
Clerical	6	56	
Teacher	0	11	
Sales	2	11	
Other	2	13	
Husband's occupation			0.83
Professional	4	20	
Clerical	6	58	
Chef	1	10	
Driver	1	10	
Technician	1	17	
Manual worker	2	8	
Other	6	33	
Family monthly income (HK$)			0.90
<10,000	7	59	
10,000-30,000	16	108	
>30,000	4	30	
Residency			0.66
Hong Kong resident	19	148	
Travelling permit from China	2	22	
Hong Kong residency >7 years			0.64
Yes	14	116	
No	5	32	

* Some data are missing as not all participants answered all of the questions

of omega-3 fatty acids was 7.9 of 12 (Figure). There were significant differences in total scores regarding education level, family monthly income, and residency in Hong Kong. Women who had completed tertiary education, had a monthly income of >HK$30,000, or who were Hong Kong residents had significantly better knowledge of omega-3 fatty acids than the other women (all $p<0.01$). Those women who were consuming omega-3 fatty acid supplements during the current pregnancy also had significantly better knowledge than those who were not taking ($p<0.01$) [Table 3]. Over 60% (148/231) women were aware that salmon is a main source of omega-3 fatty acids. For sardine and eggs, which are also source of omega-3 fatty acids, only 32% (41/129) and 14% (18/129) women in the first-trimester group provided the correct answers, respectively. Respective proportions for the third-trimester group were 31% (31/100) and 13% (13/100).

For the potential fetal benefits, 65% (151/231) women considered that there would be improvements in neurological development, whereas 27% (61/230) and 22% (50/229) believed that the supplements were beneficial to fetal visual development and cognitive development, respectively. In all, 43% (99/230) women responded that they had deliberately increased their fish intake since becoming pregnant. As the main source of omega-3 fatty acids is deep marine fish, there was concern about mercury intoxication. A total of 85% (196/231) women were aware of possible mercury intoxication whereas 61% (140/231) claimed that they understood the possible adverse impacts on fetal development. Additionally, 79% (183/231) would like to get more information on omega-3 fatty acids.

Discussion

As pregnant women and their family members are becoming increasingly concerned with health issues, the availability of nutritional supplements of different brands and formulae has increased in the local market. It is not uncommon to see pregnant women actively searching for nutritional information. However, unlike calcium, folic acid, or multi-vitamins, there is no consensus on the optimal dosage of omega-3 fatty acids despite its popularity.

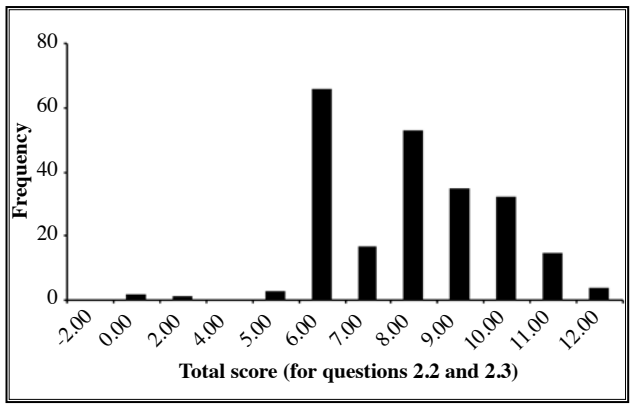

Figure. The knowledge mark distribution

To the authors' knowledge, this is the first study on consumption of omega-3 fatty acid supplements among pregnant women in Hong Kong. About one in eight subjects consumed omega-3 fatty acids during pregnancy. None of the background characteristics was associated with consumption of omega-3 fatty acids. This reflects the possibility that any pregnant woman may take these supplements. Therefore, there is a need for improved education for the general public, especially as most women start to take supplements after recommendations from friends, relatives and the media, rather than from health care professionals. Moreover, 80% of the participants would like to get more information on this topic.

The difficulty in providing this information from health care professionals may be related to the absence of a generally accepted consensus on any benefits of omega-3 fatty acids on fetal development. Although recommendations on the consumption of omega-3 fatty acids are available from various authorities, there is no consensus on the dose and regimen. This fact should be clearly conveyed to pregnant women to enable them to make an informed decision on whether or not to use these supplements.

The knowledge of the pregnant women of omega-3 fatty acids was fair, with a mean score of 7.9 of 12. As expected, those who scored significantly higher marks were of higher education level, had higher incomes, and were Hong Kong residents. These women were likely to be more health-conscious in searching for information on nutrition during pregnancy and were likely to be influenced by friends and relatives, and even the media, including internet forums. Knowledge deficiency still existed, even in those who were consumers. These women misunderstood that apples and rice were the main sources of omega-3 fatty acids, and thought that the effects were to promote fetal lung and hair development. It was unanticipated that no significant difference in knowledge of omega-3 fatty acids between women in the first and third trimesters was found, but this may reflect inadequate nutritional education during the course of pregnancy. A similar study[8] conducted in Australia revealed similar findings. The Australian study evaluated pregnant women's knowledge regarding the importance of omega-3 fatty acids consumption during

Table 3. Association of demographic characteristics with knowledge of omega-3 fatty acid supplements (n=254)

Characteristic	Questions about sources of omega-3 fatty acids		Questions about health benefits of omega-3 fatty acids		Total score*	p Value
	Mean score	p Value	Mean score	p Value		
Age (years)		0.35		0.77		0.46
≥31	4.97		3.05		7.98	
≤30	4.85		3.09		7.79	
Marital status		0.45		0.23		0.38
Single / separated	4.67		2.78		7.44	
Married	4.94		3.08		7.92	
No. of pregnancies		0.22		0.35		0.66
Second (or more) pregnancy	4.87		3.02		7.88	
First pregnancy	5.02		3.14		7.98	
No. of children		0.38		0.17		0.57
Multiparous	4.89		2.99		7.87	
Nulliparous	5.00		3.17		8.01	
Planned pregnancy		0.69		0.78		0.74
Yes	4.94		3.08		7.93	
No	4.89		3.03		7.84	
Stage of pregnancy		0.83		0.30		0.90
First trimester	4.91		3.13		7.89	
Third trimester	4.94		2.99		7.85	
Education level		<0.01		<0.01		<0.01
Tertiary or above	5.28		3.34		8.60	
Secondary or below	4.71		2.89		7.48	
Family monthly income (HK$)		0.09		0.01		0.06
≥10,000	5.01		3.19		8.07	
<10,000	4.77		2.82		7.59	
Family monthly income (HK$)		<0.01		0.03		<0.01
>30,000	5.35		3.41		8.76	
≤30,000	4.86		3.02		7.78	
Duration of Hong Kong residency		0.01		0.09		0.06
≥7 Years	5.06		3.19		8.11	
<7 Years	4.62		2.86		7.46	
Residency		<0.01		0.01		<0.01
Hong Kong resident	4.96		3.12		7.96	
Travelling permit from China	4.50		2.63		7.13	
Taken any omega-3 fatty acid supplements during this pregnancy?		0.11		<0.01		<0.01
Yes	5.17		3.59		8.76	
No	4.89		2.99		7.79	

* The total scores do not exactly the sum of the sub-items due to round-up

pregnancy and their views on the availability of current information. Results showed that three-quarters of the participants had not received information on omega-3 fatty acids. Their knowledge was limited and most had obtained their knowledge from books and magazines.

Limitations

This study was conducted in a regional public hospital in Kowloon East district, which is one of the districts in Hong Kong with the lowest monthly income. Over 20% of households living in Kowloon East have a monthly income of less than half the median income of all other households of equal size in Hong Kong[15]. Therefore, it may not be possible to extrapolate this study to reflect the general situation in Hong Kong. This study also did not investigate compliance among those women who were taking omega-3 fatty acids or the side-effect profile. Further research with a larger sample size could be performed to study the pregnancy outcomes of women who have consumed omega-3 fatty acids.

Conclusion

Although there is still a lack of evidence on the benefits of omega-3 fatty acids and there are no formal recommendations for their use, around one in eight pregnant women consumed omega-3 fatty acid supplements in this study. It would be worthwhile to conduct more research on the potential health benefits and risks of omega-3 fatty acid supplementation. Meanwhile, it is recommended that medical professionals provide more information on nutritional supplements to pregnant women as there is a high demand from this group.

Appendix

Additional material related to this article can be found on the HKJGOM website. Please go to <http://www.hkjgom.org>, search for the appropriate article, and click on Full Text (PDF).

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Appendix. Questionnaire on the use of omega-3 supplements during pregnancy

By Department of Obstetrics and Gynaecology, United Christian Hospital, Hospital Authority

The purpose of this questionnaire is to evaluate knowledge and consumption on use of long-chain omega-3 polyunsaturated fatty acid during pregnancy, so that appropriate antenatal advice and public education can be recommended accordingly.

It is optional for you to participate in this survey, but your participation is very important to the success of this study.

All the information obtained will be kept confidential.
If you have any enquiries, please feel free to contact Dr M Yu at 3513 6209

Please put a √ on the box beside your answer.

Part I. Consumption of omega-3

1. Have you taken any omega-3 supplement during this pregnancy?

☐ Yes
☐ No

If no, please proceed to part II
If yes,

1.1 When did you start taking omega-3 supplement?

☐ Before pregnancy
☐ Within a week after pregnancy test positive result
☐ First trimester (<14 weeks)
☐ Second trimester (14-28 weeks)
☐ Third trimester (>28 weeks)

1.2 Reason(s) for starting omega-3 supplement (more than 1 answer are allowed)?

☐ Recommended by friends / relatives
☐ Recommended by medical professionals
☐ Suggested by mass media (including television, magazines…)
☐ Have had personal experience in using omega-3

1.3 Which brand of omega-3 supplement do you take?

☐ AG Natural Health Omega-3
☐ Nu Pharm Super Brain DHA 75
☐ Squina Deluxe DHA 70 (DX-70)
☐ Canadian Natural CN Alaska Deep Fish Oil Super Omega-3
☐ Comvita Omega-3 Fish Oil
☐ Natural Extracts Omega-3 Fish Oil
☐ Kita DHA
☐ Meiriki Platinum DHA70
☐ Catalo Children's DHA Formula
☐ BRD Brain Up DHA & EPA
☐ aXimed Natural Omega-3 Salmon Oil
☐ Other, please specify: _____

Appendix. (cont'd)

Part II. Knowledge on risks and benefits of omega-3

2.1 Have you ever received any information on omega-3?

☐ Yes
☐ No

If yes, what is the source of your information (more than 1 answer are allowed)?

☐ Books or magazine
☐ Friends
☐ Internet
☐ Health care professionals
☐ Television
☐ Others, please specify: _____

2.2 Main source of omega-3:

Beef	☐ Yes	☐ No
Sardine	☐ Yes	☐ No
Rice	☐ Yes	☐ No
Apple	☐ Yes	☐ No
Eggs	☐ Yes	☐ No
Chicken	☐ Yes	☐ No
Salmon	☐ Yes	☐ No

2.3 Omega-3 is suggested to help fetal development of:

Brain	☐ Yes	☐ No
Lung	☐ Yes	☐ No
Vision	☐ Yes	☐ No
Hair	☐ Yes	☐ No
Cognitive function	☐ Yes	☐ No

2.4 Have you particularly increased fish consumption after pregnancy?

☐ Yes
☐ No

2.5 Have you ever heard of mercury contamination of seafood?

☐ Yes
☐ No

2.6 Are you aware of the impact of mercury on fetal development?

☐ Yes
☐ No

2.7 Do you want to receive more information on issues related to omega-3?

☐ Yes
☐ No

2.8 Do you have any particular questions about omega-3?

_____

Part III. Demographic and pregnancy information

3.1 Age (years):

☐ <20
☐ 21-30
☐ 31-40
☐ >40

Appendix. (cont'd)

3.2 Marital status:
☐ Married
☐ Single
☐ Separated

3.3 Number of pregnancies: _____
Number of children: _____

3.4 Planned pregnancy
☐ Yes
☐ No

3.5 Stage of pregnancy
☐ First trimester (<14 weeks)
☐ Third trimester (>28 weeks)

3.6 Place of antenatal checkup:
☐ Public hospital
☐ Maternal child health centre
☐ Private doctor
☐ Both public hospital and private doctor
☐ Outside Hong Kong

3.7 Education level:
☐ No formal education
☐ Primary
☐ Secondary
☐ Tertiary or above

3.8 Occupation:
☐ Housewife
☐ Health care worker
☐ Professional
☐ Others: _____

3.9 Husband's occupation:
☐ Health care worker
☐ Professional
☐ Others: _____

3.10 Family monthly income (HK$)
☐ <10,000
☐ 10,000-30,000
☐ >30,000

3.11 Residency:
☐ Hong Kong resident. Please state the duration of stay in Hong Kong: _____ years
☐ Travelling permit from China

The End. Thank you.