NUTRITIONAL VALUE OF NUTS

M. L. Wahlqvist and J. M. Hodgson

Historical considerations

Nuts can be either tree nuts, which are the hard shelled fruit of a wide variety of trees, or ground nuts usually referred to as peanuts.

Seeds and nuts have been available to mankind since his evolutionary beginnings. As a hunter-gatherer, he was perhaps more successful at gathering than hunting. The foods gathered included seeds, nuts, berries, fruits. leaves and roots.

Aboriginal Australians may well have the longest continuous food culture. Australia had a number of indigenous nuts available to them in their hunter-gatherer food style. These included the macadamia, the cycad nut, the quandong (sandalwood), the Queensland walnut, the illipi nut and the Burdekin plum. Only one of these, the macadamia, has been cultivated.

Amongst the earliest agriculturalists were the Egyptians. Some evidence of the use of nuts has been found in ancient Egyptian burial places. The tomb of Tutankhamen contained almonds. The Egyptians apparently thought of nuts as appetizers, and ascribed to them the property of being able to reduce the adverse effects of alcoholic beverages, especially drunkenness.

The English word 'nut' appears to derive from old English and German roots. It is fortuitous, one presumes, that the Latin 'nutrire', from which the word nutrition is derived, means 'to nourish'.

Nutrition and health

The principle nutritional problems of developing countries are those of achieving an adequate energy and protein intake. There are also problems of nutritional anaemia, largely related to iron deficiency.

The authors are, respectively, a Professor of medicine at the Monash University Department of Medicine, Prince Henry's Hospital, Melbourne, and a PhD candidate.

Vitamin A deficiency leading to night blindness in children, iodine deficiency, and food-bourne infestation are also problems in developing countries. Nuts can and do play a very important role in dealing with these problems.

In developed countries, the major nutritionally related problems are: atherosclerotic vascular disease, particularly heart disease; certain cancers, such as large bowel cancer; non-insulin dependent diabetes mellitus; obesity; and dental decay. In relation to these problems dietary guidelines were developed in 1979. These include:

1. Eat a variety of foods each day
2. Encourage breast feeding
3. Prevent and control obesity
4. Decrease total fat intake
5. Decrease consumption of sucrose
6. Limit alcohol consumption
7. Increase consumption of breads, cereals, fruits and vegetables
8. Reduce sodium intake
9. Encourage water intake

Nutrient composition of nuts

In general, nuts are quite high in protein. However, they also have a high energy value per unit weight. This is because nuts have a high fat content. Many other high protein foods contain less fat, however the type of fat is also an important consideration.

In affluent countries such as Australia, where energy (calorie or kilojoule) intake tends to be relatively too high, the relationship between the energy value of a food and its general nutrient value is an important consideration. In this respect nuts have a relatively high energy value per gram of usable protein. However, what may be a disadvantage to those wishing to limit their energy intake is an advantage to those in developing countries where there is a food deficit, which is as much a problem of energy as of protein.

The table below gives the average nutrient composition of ten important nuts (g/100g)

H_2O (g)	Protein (g)	Fat (g)	Carbohydrates (g)	Fibre (g)	Ash (g)
4.2	14.4	62.3	16.6	1.7	2.5

Calcium (mg)	Phosphorus (mg)	Iron (mg)	Sodium (mg)	Potassium (mg)
86	461	4.1	4	592

B-Carotene (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin C (mg)	Vitamin E (mg)
55	.65	.24	1.8	trace	17.6

Note: There is wide variation in nutrient composition according to the variety of nut

Energy

The high energy value of nuts can be seen from the following table:

Nuts	Energy/100g	
	Kilojoules	Kilocalories
Almonds	2340	560
Brazil nuts	2550	610
Cashews	2400	570
Chestnuts	720	170
Coconut (fresh)	1450	350
Hazelnut (Barcelona)	2640	560
Hazelnut (Cob)	1570	380
Macadamia	2960	710
Peanut (raw)	2360	570
Peanut (roasted/salted)	2360	570
Pecan	2940	700
Pinenuts	2490	600
Pistachio	2490	600
Sesame	2360	570
Walnuts	2170	520

If we look at the dietary guidelines (discussed earlier) it can be seen that the fourth guideline is to 'decrease total fat consumption'. This is important in the control of obesity (the third guideline). However, over the past ten years there has been increased emphasis on reducing saturated fat intake to reduce total fat intake rather than limiting unsaturated fat intake. Saturated fat is associated with heart disease. In populations, saturated fat in the major dietary determinant of blood cholesterol and consequently the incidence of heart disease.

Fat

The total fat contents of various nuts are given below in grams per 100 grams of nuts. Also given is the percentage of saturated, mono-unsaturated and poly-unsaturated fat.

Nuts	Total fat (g/100 g)	Saturated fat %	Unsaturated fat %	
			Mono-	Poly-
Almonds	53.3	8	72	20
Brazil nuts	61.5	18	58	24
Cashews	47.3	14	75	11
Chestnuts	2.7	-	-	-
Coconut (fresh)	36.0	92	6.5	1.5
Hazelnut (Barcelona)	64.0	7	89	4
Hazelnut (Cob)	36.0	6	82	12
Macadamia	73.8	13	83	4
Peanut (raw)	49.0	15	26	58
Peanut (roasted/salted)	49.0	14	25	57
Pecan	73.0	6	66	28
Pinenuts	53.9	-	-	-
Pistachio	57.7	13	74	13
Sesame	49.1	13	42	45
Walnuts	51.5	11	16	73

Fortunately nuts, with the exception of coconuts, are low in saturated fat relative to their unsaturated fat contents. Most nuts are high in mono-unsaturated fat. It is known that saturated fat is associated with heart disease, and there is evidence that poly unsaturated fats are protective against heart disease. It has been thought that mono-unsaturated fats are neutral with respect to heart disease. In the last few years however, this idea has changed with the emergence of new information. There is now evidence that mono-unsaturated fat is also protective, and that a balance between

mono- and poly-unsaturated fat is important.

In Australia, the intake of vegetable oils, including margarine, which are high in poly-unsaturated fat and tend to be quite low in saturated and mono-unsaturated fat, has increased dramatically in the past 20 years. At the present time, intake of poly-unsaturated fat is, in general, more than adequate, and may even be a little high. Reducing the total fat intake in the Australian population is still an important goal. Within this framework, it may be beneficial to have a redistribution of the type of fat consumed, away from the poly-unsaturated fat found in vegetable oils and margarine, and towards mono-unsaturated fat. This type of fat is high in many nuts (see table above).

Protein

Nuts are generally high in protein. The table below gives the protein content of various nuts. As a comparison, the protein contents of other 'high protein' foods are also given.

Nuts	Protein (g/100g)
Almonds	16.9
Brazil nuts	12.0
Cashews	18.0
Chestnuts	2.0
Coconut (fresh)	2.2
Hazelnut (Barcelona)	10.9
Hazelnut (Cob)	7.6
Macadamia	8.4
Peanut (raw)	24.3
Peanut (roasted/salted)	24.3
Pecan	9.0
Pinenuts	22.0
Pistachio	19.3
Sesame	18.6
Walnuts	10.6
Lean Beef	18.8
Egg (Chicken)	12.9
Cottage Cheese	12.3

Carbohydrates/Fibre

Most nuts, with the exception of chestnuts, and to a lesser degree, cashews, are low in the type of carbohydrate which is available for absorption in the small bowel. As can be seen from the dietary guidelines, people are being encouraged to increase their intake of unrefined carbohydrate from plant sources. Nuts are peculiar in the sense that they have relatively high fibre (non-absorbable carbohydrate). Nuts may therefore be an important contributor to carbohydrate variety. This information is given in the following table.

Nuts	Carbohydrate g/100g	Dietary Fibre g/100g
Almonds	4.3	14.3
Brazil nuts	4.2	9.0
Cashews	27.7	2.9
Chestnuts	36.6	6.8
Coconut (fresh)	3.7	13.6
Hazelnut (Barcelona)	5.2	10.3
Hazelnut (Cob)	6.8	6.1
Macadamia	14.0	2.5
Peanut (raw)	8.6	8.1
Peanut (roasted/salted)	8.6	8.1
Pecan	13.0	2.3
Pinenuts	16.0	1.1
Pistachio	19.3	6.5
Sesame	21.6	-
Walnuts	5.0	5.2

Minerals

Nuts also contribute important amounts of the essential elements (minerals). These include potassium, magnesium, iron and zinc.

Nuts	Sodium mg/100g	Potassium mg/100g	Magnesium mg/100g	Iron mg/100g	Zinc mg/100g
Almonds	6	860	260	4.2	3.1
Brazil nuts	2	760	410	2.8	4.2
Cashews	5	552	267	2.8	2.8
Chestnuts	11	500	33	0.9	1.3
Coconut (fresh)	17	379	52	2.1	0.5
Hazelnut (Barcelona)	3	940	200	3.0	4.4
Hazelnut (Cob)	1	636	56	1.1	2.4
Macadamia	-	264	-	2.0	-
Peanut (raw)	6	706	180	2.0	3.0
Peanut (roasted/salted)	440	777	180	2.0	2.3
Pecan	3	1499	142	2.4	2.4
Pinenuts	-	-	-	5.2	-
Pistachio	-	158	158	7.3	7.3
Sesame	60	-	-	10.5	-
Walnuts	3	544	130	2.4	3.0

When nuts are salted they can contribute excessive amounts of sodium which is thought to be important as a factor in the development of high blood pressure in sensitive people. Perhaps the high potassium content of nuts might upset this potentially deleterious effect of sodium. The high potassium content of nuts without the increase in sodium which comes with salting may be beneficial with respect to blood pressure.

Vitamins

The vitamin content of nuts is also significant. The thiamin and vitamin E content of a

variety of nuts is given in the table below. These two vitamins are particularly important in nuts.

Nuts	Thiamin	Vitamin E	
		Alpha	Gamma
	mg/100g	mg/100g	mg/100g
Almonds	.24	20.0	3.0
Brazil nuts	.96	6.5	11.0
Cashews	.56	0.3	5.2
Chestnuts	.22	0.5	7.0
Coconut (fresh)	.06	0.7	1.5
Hazelnut (Barcelona)	.29	-	-
Hazelnut (Cob)	.46	21.7	0.3
Macadamia	.37	-	-
Peanut (raw)	.90	8.1	8.8
Peanut (roasted/salted)	.23	8.1	8.8
Pecan	.86	1.2	18.6
Pinenuts	1.28	18.6	-
Pistachio	.67	5.2	-
Sesame	.98	-	-
Walnuts	.33	0.8	18.0

One of the more important consequences of alcohol abuse is thiamin deficiency, and the practice of eating nuts with alcoholic beverages may well offset some of this risk. However, the best way to address alcohol abuse in still to decrease consumption.

Concern has sometimes been expressed that a higher intake of poly-unsaturated fat may lead to a relative deficiency of vitamin E. In Australia the intake of poly-unsaturated fat is generally quite high, and the intake of mono-unsaturated fat often quite low. In the case of nuts, they are relatively high in vitamin E, and often high in mono-unsaturate fats. This may help with vitamin E status.

In order to gauge the contribution of nuts to the recommended daily allowance of various nutrients, the recommended allowances for Australians can be obtained from the Australian Government Printer. A more detailed analysis can be found in 'Recommended Nutrient Intakes: Australian Papers' (see bibliography). The table below gives some of this information.

Recommended nutrient intakes for adults (expressed as mean daily intake)

	Men		Women			
	19–64 yrs	64+ yrs	19–54 yrs	54+ yrs	Pregnant	Lactating
Vitamin A (µg retinol equivalents)	750	750	750	750	+0	+450
Thiamin (mg)	1.1	0.9	0.8	0.7	+0.2	+0.4
Riboflavin (mg)	1.7	1.3	1.2	1.0	+0.3	+0.5
Niacin (mg niacin equivalents)	10–20	14–17	12–14	10–12	+2	+5
Vitamin B-6	1.3–1.9	1.0–1.5	0.9–1.4	0.8–1.1	+0.1	+0.7–0.8
Total folate (µg)	200	200	200	200	+200	+150
Vitamin B-12 (µg)	2.0	2.0	2.0	2.0	+1.0	+0.5
Vitamin C	40	40	30	30	+30	+30
Vitamin E (mg alpha tocopheral equivalents)	10.0	10.0	7.0	7.0	+0	+2.5
Zinc (mg)	12	12	12	12	+4	+6
Iron (mg)	7	7	12–16	5–7	+10–20	+0
Iodine (µg)	150	150	120	120	+30	+50
Magnesium (mg)	320	320	270	270	+30	+70
Calcium (mg)	800	800	800	1000	+300	+400
Phosphorus (mg)	1000	1000	1000	1000	+200	+200
Selenium (µg)	85	85	70	70	+10	+15
Sodium (mmol)	40–100	40–100	40–100	40–100	+0	+0
(mg)	920–2300	920–2300	920–2300	920–2300	+0	+0
Potassium (mmol)	50–140	50–140	50–140	50–140	+0	+0
(mg)	1950–5460	1950–5460	1950–5460	1950–5460	+0	+0
Protein (g)	55	55	45	45	+6	+16

Source: *Recommended Nutrient Intakes: Australian Papers*

Aflatoxins and nuts

When nuts, cereals and some other foods are contaminated by certain moulds, they may contain unacceptable levels of toxins produced by these moulds. These toxins are known as mycotoxins. Those of particular concern are the aflatoxins, and in particular aflatoxin B_1 which has the propensity to produce cancer, especially of the liver.

Admittedly, most of the evidence comes from the experimental animal, although there is some epidemiologic evidence to support the importance of this in man. Nevertheless, the view is taken that it is unacceptable to have significant aflatoxin levels in food. Measures to minimise the chance of mould formation in nuts are therefore important. These are mainly, to avoid damage to nuts during harvest, and to store them in dry conditions.

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