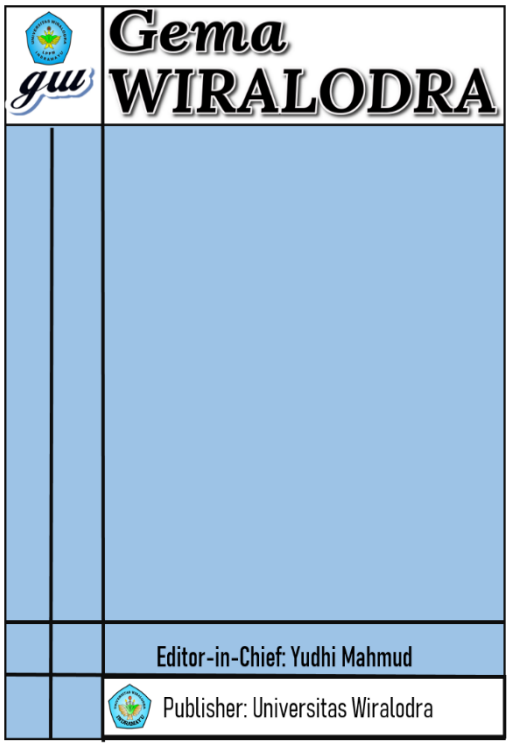
Gema Wiralodra

Publication details, including instructions for authors and subscription information:
https://gemawiralodra.unwir.ac.id



An Analysis Of Energy And Nutrient Content In High Energy Natural Isotonic Drink (Isopower)

Nurulfuadi[a*], Dinda Widi Wisudarsari[b], I Made Tangkas[c], Ummu Aiman[d], St. Ika Fitrasyah[e], Desmeli[f], Saadatul Husna[g]

[a*]Tadulako University, Indonesia, fuadinurul22@gmail.com
[b] Tadulako University, Indonesia, fitrianisry090@gmail.com
[c] Tadulako University, Indonesia, biotangkas@gmail.com
[d] Tadulako University, Indonesia, ummuaimans.ua@gmail.com
[e] Tadulako University, Indonesia, ikafitrasyah@gmail.com
[f] Tadulako University, Indonesia, desmelymeli20@gmail.com
[g] Akademi Komunitas Industri Manufaktur Bantaeng, Indonesia, saadatulhusna@akom-bantaeng.ac.id

To cite this article:
Nurulfuadi, N., Wisudarsari, D. W., Tangkas, I. M., Aiman, U., Fitrasyah, S. I., Desmeli, D., Husna, S. (2024). An Analysis Of Energy And Nutrient Content In High Energy Natural Isotonic Drink (Isopower). *Gema Wiralodra*, *15*(2), 813 – 818.
To link to this article:
https://gemawiralodra.unwir.ac.id/index.php/gemawiralodra/issue/view/25
Published by:
Universitas Wiralodra
Jln. Ir. H. Juanda Km 3 Indramayu, West Java, Indonesia

Gema Wiralodra, 15(2), 813 – 818
https://gemawiralodra.unwir.ac.id/index.php/gemawiralodra
p-ISSN: **1693-7945**
e –ISSN: **2622 - 1969**

Orginal Article

An Analysis Of Energy And Nutrient Content In High Energy Natural Isotonic Drink (Isopower)

Nurulfuadi[a*], Dinda Widi Wisudarsari[b], I Made Tangkas[c], Ummu Aiman[d], St. Ika Fitrasyah[e], Desmeli[f], Saadatul Husna[g]
[a*]Tadulako University, Indonesia, fuadinurul22@gmail.com
[b] Tadulako University, Indonesia, fitrianisry090@gmail.com
[c] Tadulako University, Indonesia, biotangkas@gmail.com
[d] Tadulako University, Indonesia, ummuaimans.ua@gmail.com
[e] Tadulako University, Indonesia, ikafitrasyah@gmail.com
[f] Tadulako University, Indonesia, desmelymeli20@gmail.com
[g] Akademi Komunitas Industri Manufaktur Bantaeng, Indonesia, saadatulhusna@akom-bantaeng.ac.id

***Correspondence: fuadinurul22@gmail.com**

Abstract
Isotonic drink is the carbonated or non-carbonated drink product used to subtitute the fluid lost in the body. Lack of fluid in the body can cause muscle fatigue until causing the performance decrease in athlete. Isotonic drink can accelerate the return of body fluid compared to water. The purpose of this research was to analyze the content of energy, sodium, potassium, and Vitamin C in isotonic drink with raw material coconut water, pure coconut oil, bee bread, palm vinegar, and honey as high energy natural istotonic drink. The research design used was descriptive observation based laboratory test. The data analysis employed SPSS 22 programs namely by carrying out descriptive test until obtained the average for each isotonic namely 247,491 kkla, sodium 77,085 mg.kg, potassium 1000,785 mg/kg and Vitamin C 2,112 mg. This research concluded that the energy drink content has fulfilled the quality specification of isotonic drink, while the sodium and potassium level do not fulfill the quality specification of isotonic drink yet. Likewise with the Vitamin C content which also does not fulfill the Referrence of Nutrition Label namely 10%.
Keywords: Isotonic Drink, Energy, Nutrition

1. Introduction

Consuming carbonated softdrink product or the non-carbonated one such as isotonic drink is trusted to have the ability to increase the body fitness because it contains sugar, citric acid, and mineral (National Standard Agency, 1998). Compared to the usual water, the drink which contains carbohydrate and salt (electrolyte) can increase the body performance when consumed during exercising (Coyle, 2004). After exercising, the body will take a rest and recover the condition as it is. Recovery is returning the body condition before doing the exercise, one of the way to help the recovery is by consuming isotonic drink. The giving of isotonic drink influences the hydration status of body fluid after carrying out jogging which means isotonic drink can help replacing the body fluid lost/overcoming dehydration (Habibullah, 2019).

Coconut water is the natural material which can hydrate the body quickly. Indonesia itself is the producer of coconut product amounted 2,8 million tons in 2017 until 2019 (Statistics Center Agency, 2018). Besides, the making of isotonic drink comes from coconut water that can eliminate unfresh taste, thirst, and fatigue after the training without making the athlete

p-ISSN: **1693-7945**
e –ISSN: **2622 - 1969**

feeling bloated and nauseous (Ridha, 2016). Another product that comes from coconut water is Virgin Coconut Oil which has the highest lauric acid in the form of Medium Chain Glycerol/MCT) until it is easy to absorb by blood and can increase the energy two times from the energy contained in carbohydrate sugar which is suitable to be added in making isotonic drink (Silalahi et.al, 2019). Not only that, the natural sweetener addition such as honey and palm sap vinegar is also highly required for the taste of a drink product. Honey is the natural sweetener which has low glychemic index and contains antioxidant, flavonoid, and phenolic acid (Bakour et al., 2022). Beside honey, there is also bee bread which is the product resulted from bee activity. Bee bread is known as the source of vitamin, mineral, amino acid, hormone, enzyme, and fat needed by the body. Bee bread if consumed in big number can function as stamina enhancer, giving the energy to the body and keep the body endurance (Ping et al., 2018).

Isotonic drink which is made of the materials above is expected to have benefits such as to subtitute the mission ion in the body caused by physical activity and can be categorized as health drink because it contains materials that are basically safe and natural, until it is relatively safe to be consumed by all community circles and ages. Some food materials used in making this isotonic drink are coconut water, honey, virgin coconut oil, bee bread, and palm sap vinegar. The purpose of this research was to analyze the level of energy, Vitamin C, sodium, and potassium obtained in high energy natural istotonic drink.

2. Research Method

The type of this research was experimental with sample test was carried out through duplo. The research design used on the analysis of energy and nutrient content was by using descriptive observative based on laboratory test. The analysis of Vitamin C level was by using wet destruction method then was continued to be analyzed by using AAS type AA-7000 Shimadzu tool, the energy level was counted based on the composition of fat, protein, and carbohydrate (Almatsier, 2004).

3. Result and Discussion

The Result of Laboratory Test

Tabel 1 Kandungan Energi dan Zat Gizi Isopower

Parameter	Repetition		Average	Reference
	1	2		
Energy	245,038 kkal	249,944 kkal	247,491 kkal	>240 kkal
Vitamin C	2,01 mg/g	2,214 mg/g	2,112 mg/g	8,1-9,9 mg/g
Sodium	74,34 mg/kg	79,83 mg/kg	77,085 mg/kg	Maks. 800-1000 mg/kg
Potassium	1085,96 mg/kg	915,61 mg/kg	1000,785 mg/kg	Maks. 125-175 mg/kg

The analysis result obtained the average content of isopower energy was 247,491 kkal, where it had reached the standard of referrence energy namely >240 kkal (BPOM, 2019). Based on the energy calculation conducted, known that protein contributed amounted 28 kkal, carbohydrate 43 kkal, and fat amounted 175 kkal towards the giving of total energy. Fat contributed very high in giving the energy of isopower drink.

In the system of aerobic energy, one unit glycogen molecule can regenerate 38 ATP Units, while in unaerobic can only regenerate 2 ATP units. Aerobic system is suggested to the athlete with low until medium intensity because all energy are changed to be ATP (Judge & Dodd,

p-ISSN: **1693-7945**
e –ISSN: **2622 - 1969**

2020). The dominant sport branches using aerobic system are swimming 100 meters distance, running 800 meters distance, gymnastics, and marathon run (Bompa Tudor & Buzzichelli Carlo A, 2019). It can be concluded that isopower drink is suggested to be given to athletes with low until medium intensity where fat availability is the main required source of energy.

The average level of Vitamin C of isopower drink is 2.112 mg/g. The Vitamin C level in isopower drink is lower than the referrence of Nutrition Label where the referrence value for Vitamin C in energy drink is 8,1 – 9,9 mg/g (BPOM, 2016). Vitamin C plays the role as antioxidant which can contribute electron until protecting important biomolecule which is damaged by oxidant the rule of body metabolism, poison exposure, and pollutant (Higgins et al., 2020). If the body is lack of Vitamin C then it will cause the decrease in body endurance and weak muscle contraction and fatige occurs. The symptom of lacking Vitamin C is marked by physical deterioration (Hardiansyah., 2017).

Vitamin C plays important role in small molecule biosynthesis such as the protein called carnitine. Carnitine itself plays the role to direct fat molecule to network cells where fat burning occurs. Lack of fat molecule during metabolism process can cause energy decrease and fatigue. Therefore, if carnitine level in the body decreases then fat accumulation occurs. Not only that, Vitamin C also can help recovery process after activity (Jannah, 2019). Therefore, sufficient Vitamin C content is required in isopower drink until it can help the process of energy formation in the body.

The increase of free radicals caused by physical activity can influence aerobic energy path in mitochondria, until causing fatigue occurrence and decrease of someone's fitness (Yimcharoen et al., 2019). Therefore, Vitamin C role as antioxidant can minimize fatigue and decrease of someone's fitness (Wibawa et al., 2020). The research done by Uliyandri (2009) confirmed that athlete who does exercise routinely will have higher value of VO2 max. VO2 Max is an indicator to find out the level of body fitness. The level of a good body fitness has higher VO2 Max until one can do activity stronger (Kaminsky et AL., 2013). During training, athlete needs energy to support their performance, therefore Vitamin C plays the role to optimize energy formation until it can support the training done by the athlete.

Based on the referrence from National Standard Agency (1998) about The Specification of Isotonic Drink Quality Requirement that isopower drink does not fulfill yet the determined requirement amounted 800-1000 mg/Kg. In the formulation of isopower drink, known the sodium level comes from coconut water, honey, palm vinegar, and bee bread. Sodium is one of minerals which function for electricity movement passing cel membrane until different electricity occurs among the part in and outside the cel. This is required to transmit nerve impuls and as the trigger of muscle contraction (Hardiansyah., 2017). Until it can be concluded that sodium plays a role in muscle movement. If the body is lack of sodium, then muscle fatigue will occur.

The role of sodium in muscle fatigue mechanism is to keep sarcolemma depolarization and t-tubular membrane. The disorder in sarcolemma depolarization and t-tubular membrane will cause regulation disorder of Ca+ ion in intracell. Electrolyte change and fluid balance disorder in the body will influence sarcolemma depolarization and t-tubular membrane which causes the activity of Ca+ ion and energy supply disturbed until the muscle contraction weakens and causing muscle fatigue. The increase of Na+, K+ and ATPase activity can stablize Na and K concentration in membrane until they can prevent muscle fatigue (Konopka & Nair, 2013; McKenna et, al., 2008; Powers et, al., 2011). The research concerning the giving of natural isotonic drink which contrain sodium towards the athlete body fitness using coconut water found out that the consumption of pure coconut water gives increase of VO2 value. The giving of coconut water itself aims to keep the body hydrated well through the setting of fluid

p-ISSN: **1693-7945**
e –ISSN: **2622 - 1969**

supply. This is one of the way so that athlete can maintain their body fitness (Alfiyana and Murbawani, 2012).

Potassium level of isopower drink through the result of sample average calculation with twice repetition was 1000,785 mg/Kg. Based on the quality standard determined by National Standard Agency (1998) about The Specification of Isotonic Drink Quality Requirements that isopower drink does not fulfill yet the determined requirement namely 125-175 mg/Kg maximally. Excess potassium level in isopower drink is truly influenced by the material kind in the making of this drink. The material which has high potassium content is young coconut water with variety genjah coconut that has high potassium content namely 266.13 mg/100 ml (Prasetiyo et, al., 2021). Then potassium level in honey is 26,9 mg/100gr (TKPI, 2017), in another material namely bee bread has potassium content amounted 0,74% (Bakour et al., 2022), and palm sugar has potassium content amounted 390,4 mg/100 g potassium (TKPI, 2017).

The potassium role in body as the main cation from intracellular fluid is very important because it influences the muscle activity especially the heart muscle. During the muscle contraction, potassium gets out from the muscle cell to extracellular fluid then this outing fraction will return to the muscle network (Putu Putra, 2016). Potassium also functions in glycogen and glucose metabolism where glucose is changed to be glycogen saved in the heart for energy (Hardiansyah., 2017). During the exercise, the athelete's body will loose fluids along with electrolyte contained in sweat such as sodium and potassium. The lost electrolyte depends on how much total fluids gone and the electrolyte concentration in the sweat. The average concentration of sodium in sweat is 35 mEq/L, while the potassium concentration is 5 mEq/L (Michael NS et., al., 2007). The function of sodium and potassium working together in the muscle contration is to keep the body fluid balance and cardiovascular function (Hardiansyah., 2017).

The research realted to the impact of giving natural isotonic drink such as coconut water towards the athlete's body fitness found out that there is increase of VO2 Max value towards the body of football athletes (Alfiyana and Murbawani, 2012). It can be known that coconut water has high potassium level, until the giving of coconut water aims to keep the body hydrated well through the setting of fluid supply. This is one of the way to keep the athlete's body fitness.

4. Conclusion

The formulation of isopower drink has high energy content amounted 247,491 kkal, low Vitamin C content amounted 2,112 mg, low sodium content amounted 77,085 mg/Kg, and high potassium content amounted 1000,785 mg/Kg. Based on the nutrients content in this drink then it is expected to give benefit in athlete's fitness improvement when consuming it. However, the low/high nutrients content in this drink is less effective in giving benefit related to the fitness of athlete's body. Therefore, it is necessary to modify the food material selection in isopower drink in order to be more efficient in increasing the fitness of athlete's body.

5. References

Alfiyana, L., & Murbawani, E. A. (2012). Pengaruh pemberian air kelapa terhadap kebugaran atlet sepak bola.

Almatsier, S. (2004). Prinsip dasar ilmu gizi.

Badan Pengawasan Obat dan Makanan. (2019). Peraturan Badan Pengawas Obat Dan Makanan Nomor 22 Tahun 2019 Tentang Informasi Nilai Gizi Pada Label Pangan Olahan.

p-ISSN: **1693-7945**
e –ISSN: **2622 - 1969**

Badan Pusat Statistika. (2018). Badan pusat statistik. BPS-Statistics Indonesia.

Badan Standar Nasional. (1998). SNI 01- 44552- 1998: Minuman Isotonik. Jakarta : BSN.

Bakour, M., Laaroussi, H., Ousaaid, D., El Ghouizi, A., Es-Safi, I., Mechchate, H., & Lyoussi, B. (2022). Bee Bread as a Promising Source of Bioactive Molecules and Functional Properties: An Up-To-Date Review. *Antibiotics*, *11*(2), 203. https://doi.org/10.3390/antibiotics11020203

Bunpo, P. (2019). Effects of ascorbic acid supplementation on oxidative stress markers in healthy women following a single bout of exercise. Journal of the International Society of Sports Nutrition, 16(1), 1–9. https://doi.org/10.1186/s12970-019-0269-8

BPOM. (2016). Acuan Label Gizi.

BPOM. (2019). Peraturan Badan Pengawasan Obat dan Makanan Nomor 24 Tahun 2019 Tentang Perubahan Atas Peraturan Badan Pengawasan Obat dan Makanan Nomor 1 Tahun 2018 TentangPengawasan Pangan Olahan Untuk Keperluan Gizi Khusus.

Coyle, E. F. (2004). Fluid and fuel intake during exercise. Journal of sports sciences, 22(1), 39–55.

Habibullah, H. (2019). Pengaruh Pemberian Minuman Isotonik Terhadap Status Hidrasi Cairan Tubuh Setelah Melakukan Jogging Pada Siswa SMA Plus Budi Utomo Makassar.

Hardiansyah, D., & Supariasa, N. D. I. (2017). Ilmu Gizi, Teori dan Aplikasi. EGC.

Higgins, M., Izadi, A., & Kaviani, M. (2020). Antioxidants and Exercise Performance: With a Focus on Vitamin E and C Supplementation. *International Journal of Environmental Research and Public Health*, *17*(22), 8452. https://doi.org/10.3390/ijerph17228452

Jannah, A. M. (2019). Pengaruh Pemberian Vitamin C Terhadap Recovery Setelah Beraktifitas Fisik Pada Atlet Sepak Bola SMA Negeri 2 Sinjai. Universitas Negeri Makasar.

J. Silalahi, WA.Barus, DR.Anggraini, A.Dalimunthe, YCE.Silalahi. The effect of Acute Consumption of Hydrolyzed Oils on Swimming Capacity Endurance of Mice (Mus Musculus). Asian J Pharm Clin Res. 12(1); 512-515.2019. [14]. FS. Loung, J.Silalahi, D.Suryanto. Antibacterial activity of Enzymatic hydrolyzed

Judge, A., & Dodd, M. S. (2020). Metabolism. *Essays in Biochemistry*, *64*(4), 607–647. https://doi.org/10.1042/EBC20190041

Kaminsky LA, Arena R, Beckie TM, Brubaker PH, Church TS, Forman DE, et al. The Importance of Cardiorespiratory Fitness in the United States: The Need for a National Registry: A Policy Statement From the American Heart Association. Circulation 127: 652–62, 2013.

Konopka, A. R., & Nair, K. S. (2013). Mitochondrial and skeletal muscle health with advancing age. Molecular and cellular endocrinology, 379(1–2), 19–29.

Michael N S, Louise M B, Randy E, Ronald J M, Scott J M, & Nina M S. (2007). Exercice and fluid replacement. American College of Sport Medicine.

Ping, F. W. C., Chen, C. K., Ooi, F. K., & Mohamed, M. (2018). *Effects of bee bread supplementation on endurance running performance and total antioxidant status in recreational athletes*.

Powers, S. K., Nelson, W. B., & Hudson, M. B. (2011). Exercise-induced oxidative stress in humans: Cause and consequences. Free Radical Biology and Medicine, 51(5), 942–950.

Prasetiyo, G., Lubis, N., & Junaedi, E. C. (2021). Kandungan Kalium dan Natrium dalam Air Kelapa dari Tiga Varietas Sebagai Minuman Isotonik Alami: Review: Potassium and Sodium Content in Coconut Water from Three Varieties As Natural Isotonic Drinks. Jurnal Sains dan Kesehatan, 3(4), 593–600.

p-ISSN: **1693-7945**
e –ISSN: **2622 - 1969**

Ridha, D. A. (2016). Program Studi Kedokteran Gigi Fakultas Kedokteran Gigi Universitas Muhammadiyah Surakarta 2016. 14.

Tabel Komposisi Pangan Indonesia. (2017). Tabel Komposisi Pangan Indonesia.

Tudor O. Bompa, Carlo A. Buzzichelli. 2019. Periodization-6th Edition: Theory and Methodology of Training. United State: Human Kinetics.

Waritsu, L. O. M. A. (2019). Pengaruh Pemberian Madu Dan Gula Merah Terhadap VO2 Max Atlet Tenis Meja UKM Olahraga UNM.

Wibawa, J. C., Wati, L. H., & Arifin, M. Z. (2020). Mekanisme Vitamin C Menurunkan Stres Oksidatif Setelah Aktivitas Fisik. *JOSSAE : Journal of Sport Science and Education*, *5*(1), 57. https://doi.org/10.26740/jossae.v5n1.p57-63

Yimcharoen, M., Kittikunnathum, S., Suknikorn, C., Nak-On, W., Yeethong, P., Anthony, T. G., &