



## **Blood calcium levels in factory workers who consume supplements drinks**

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### ABSTRACT

Energy supplement drinks are drinks that contain caffeine, taurine, sweeteners, and other substances that have the effect of increasing energy, concentration, alertness, maintaining physical strength, and reducing drowsiness. Blood calcium is an important mineral that the body needs. The purpose of this study was to determine blood calcium levels in marble factory workers in Besole Village, Tulungagung Regency. The research design used was Analytical Descriptive. The population in this study were all marble factory workers who routinely consumed energy supplement drinks in the village of Besole in 2018 using a total sampling technique of 30 respondents. This research was conducted at the Laboratory of Dr. Iskak Tulungagung in May 2018 using the O-CPC method. The results obtained from the examination of blood calcium in marble factory workers showed 10 respondents (33%) had blood calcium levels within normal limits, 17 respondents (57%) had deep blood calcium levels. low limit and 3 respondents (10%) had very low blood calcium levels. Consumption of energy supplement drinks that exceed the threshold can damage the kidneys and affect blood calcium levels because the caffeine content in energy supplements can increase the release of calcium in the bones so that more calcium is released through the urine.

#### Keywords:

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## INTRODUCTION

Energy drinks are carbonated non-alcoholic drinks that are designed to stimulate the metabolic and central nervous system so that they can affect physical and mental performance during activities.<sup>1</sup> The effects of energy drinks can be felt 30-60 minutes after use and the effects are still felt for less from 90 minutes.<sup>2</sup>

Consumption of energy drinks has continued to gain popularity since the debut of Red Bull in 1997 and dominated the market for energy drinks in America. More than 500 new energy drinks were launched worldwide in 2006 and beverage companies reaped financial rewards from the energy drink industry worth 5.7 billion dollars.<sup>3</sup> It can be concluded that there is an increase in the energy drink industry that provides a large profit for the producers.

Energy supplement drinks are drinks that are added with vitamin B complex, herbal extracts, caffeine, taurine, sugar or sweeteners that can give effect to users such as increasing concentration, energy, maintaining physical strength, alertness, reducing sleepiness and making thinking power clearer.<sup>4</sup> The general public believes that consuming energy drinks can restore energy quickly so that it can resume activities as usual.<sup>5</sup>

Calcium is the most abundant mineral in the body, which is 1.5% -2% of adult body weight or approximately 1 kg. Of these, 99% are in hard tissue, namely bones and teeth.<sup>6</sup> Calcium is very necessary for normal development and maintaining bodily functions.



Calcium is needed for various important processes such as neuron excitability, neurotransmitter release, muscle contraction, membrane integrity and blood clotting.<sup>7</sup>

This calcium can move into the blood. After the age of 20 years normally there will be a placement of about 1200 grams of calcium in the body. Most calcium is concentrated in cartilage and teeth, the rest is in body fluids and tissues. Generally, blood calcium levels are carefully controlled. When blood calcium levels are low (hypokalemia), bones expel calcium to reverse normal levels of calcium in the blood so that it becomes higher (hyperkalemia), excess calcium is stored in the bones and released from the body through urine and feces, so that calcium can be absorbed the body effectively, we must consume it together with vitamin D.<sup>8</sup>

The most widely used stimulant in the world is Caffeine which is widely available in drinks, drugs, supplements, and sweets.<sup>9</sup> In adults, caffeine can affect arousal, attention to reaction time and sleep.<sup>10</sup> Caffeine is quickly absorbed in the stomach and small intestine and is metabolized especially in the liver. Caffeine is excreted in urine 24 hours as dimethylxanthines, uric acid derivatives, and 2.4% caffeine. Caffeine in plasma can last up to 12 hours.<sup>11</sup> Caffeine works in the body by taking over adenosine receptors in nerve cells which will stimulate the production of adrenal hormones and cause increased blood pressure, gastric acid secretion, and muscle activity, and stimulation of the liver to release sugar compounds in the bloodstream to produce extra energy.<sup>12</sup> Caffeine is associated with diuresis and electrolyte fluid balance. Caffeine stimulates glomerulus renal filtration and inhibits sodium reabsorption, which triggers an increase in excretion of sodium and water.<sup>13</sup>

Based on previous research on coffee drinkers in Rejosari Village, Karangwen District, Demak Regency in 2012 showed 26 respondents (86.67%) had blood calcium levels within normal limits and 4 respondents (13.33%) had leveled blood calcium is more than normal.<sup>14</sup> The marble industry is part of the economic activity of the people in the marble mining area which is one of the important livelihoods for the people of Besole Village. This activity certainly requires enough energy and stamina for the workers. The need for strong stamina is balanced by workers consuming energy supplement drinks which are believed to be able to add extra energy, but the presence of caffeine in energy supplements can increase calcium release in the bones so that more calcium is released through the urine. From the description above, researchers are interested in knowing blood calcium levels in marble factory workers in Besole Village, Tulungagung Regency.

## MATERIALS AND METHODS

This study uses descriptive non-analytic research design. The purpose of this study was to determine blood calcium levels in marble factory workers in the village of Besole Tulungagung. The population in this study is marble factory workers who routinely consume energy supplement drinks in the village of Besole, Tulungagung district. The sample in this study was 30 marble factory workers.

### Venous Blood Extraction

Clean the vein with 70% alcohol and let it dry. Then put a tornado on the upper arm. Vein damming does not need to be tightly bonded, it should even be tight enough to show and rather highlight the vein, tighten the skin over the vein with the fingers of the left hand so that the vein cannot move. Stick the skin with a needle and a syringe in the right hand to the tip of the needle into the lumen of the vein. Remove or stretch the dam and slowly pull the syringe until the amount of blood you want is obtained. Remove the dam if it is still installed. Cover with cotton on the needle and pull out the syringe and needle. Ask the person whose blood was taken so that the puncture site was pressed for several minutes with the cotton. Lift the needle from the syringe and drain (do not spray) blood into the container or tube available through the wall.<sup>15</sup>



### Making Serum

Prepare tools and materials. Take blood from veins as much as 3 ccs (or as needed) Insert blood into the test tube or centrifuge tube through the tube wall. Leave it at room temperature 15-30 minutes until the blood freezes. Separate serum and blood cells by centrifugation at 3000 rpm for 20 minutes. After a separate serum is put into the sample bottle that has been prepared.<sup>15</sup>

### Tools preparation

How the Photometer (RA-50) tool works first starts the photometer 15 minutes before the inspection begins, select the Ca (Calcium) program. Press 1 enter: Blank then press "blank" Standard press "calibrate", then press "analyze". Check and confirm that the program test is in accordance with the instructions for calcium reagents. Do it to read the test according to the command on the tool by pressing "analyze". Enter samples one by one by pressing the "Analyze" button. The results will be printed on the monitor screen. Press power off when you turn off the device, then press the power button "off".<sup>15</sup>

### Calcium Examination Procedure

The method used is the O-CPC method. The reference value of blood calcium is 8.6 - 10.2 mg/dl. The principle used Calcium ions will react with O - Cresolphthalein - Complexone to form complex purple in an alkaline atmosphere. How it works Calcium examination is done by piping the sample and a standard of 20  $\mu$ L and a reagent of 1000  $\mu$ L. Then mix until homogeneous and incubate 5-10 minutes at room temperature ( $\pm$  25°C). Read the results on the RA-50 photometer with a wavelength of 578nm.<sup>16</sup>

## RESULTS AND DISCUSSION

The results of the study of calcium levels in 30 marble factory workers who consumed energy-based drinks will be presented as follows:

**Table 4.1 Frequency Distribution of Respondents Who Consumed Energy Supplement Drinks based on Statistics**

No	Age Category (Years)	Frequency (n)	Percentage (%)
1	20 – 29 Years	3	10 %
2	30 – 39 Years	11	36,8 %
3	40 – 49 Years	8	26,7 %
4	50 – 59 Years	7	23,5%
5	60 – 69 Years	1	3%
Total		30	100

Based on table 4.1, it is known that respondents who consumed the most energy supplement drinks were the 30-39 year age group of 36.8%. This is in line with the research conducted which stated that respondents who consumed the most energy supplement drinks were found in the 31-37 year age group as much as 33.3%.<sup>17</sup> Based on preliminary research, there were more than 20-29 years like to consume soft drinks compared to energy supplement drinks because they are considered lighter for consumption, besides young people still have good power to do high activities so they assume that they do not need to consume too many energy supplements. Groups over the age of 39 are more likely to consume energy supplement drinks because they assume that age factors influence physical strength in carrying out the high activity so that to meet their needs they rely more on consuming energy supplement drinks which are believed to add extra energy.



**Table 4.2 Frequency Distribution of Respondents by Level of Consumption of Beverage Energy Supplements**

No	The consumption level category of respondents	Frequency (n)	Percentage (%)
1	Drink often (3-5 times/week)	12	40 %
2	Rarely drink (1-2 times/week)	18	60 %
Total		30	100

From table 4.2 it is known that respondents who consume the most energy supplement drinks based on consumption level are rarely drunk (1-2 times/week) as many as 18 respondents (60%), this is not in line with the research stating the frequency of consumption of energy supplement drinks at night bus drivers is often (7-14 times/week) as much as 55.6%. Marble factory workers in Besole Village, Tulungagung Regency are relatively few consuming energy supplement drinks, this is because in the age group of 20-29 most respondents prefer to consume soft drinks than energy supplement drinks while in the age group > 50 years tend to prefer to consume coffee because at that age coffee is more an option to be enjoyed when relaxing or resting after work, besides the marble factory workers do work activities from morning to evening so that at night they can still rest. Unlike the night bus driver who needs more stamina and tries not to get sleepy when driving at night.

Energy drinks that are included in supplements should be consumed adequately because the purpose is only to supplement the nutritional needs that are not sufficient. Basically, the function of supplements is as an additive to improve and increase endurance.<sup>18</sup> From the results of a preliminary study on 30 to 31 January 2009, patients undergoing hemodialysis therapy in the hemodialysis room at the Malang Military Hospital were given 16 patients suffering from chronic kidney failure, 7 of whom said that kidney disease was a result of frequent consumption of energy drinks that were on television advertising.<sup>12</sup> Frequency distribution of respondents based on the results of blood calcium levels can be seen in table 4.3

**Table 4.3 Distribution of Respondents' Frequency Based on the Results of Blood Calcium Levels**

No	Blood calcium category	Frequency (n)	Percentage (%)
1	Normal (8,6 – 10,2 mg/dl)	10	33%
2	Low (<8.6 mg/dl)	17	57%
3	Very low (<8.0 mg / dl)	3	10%
Total		30	100

Based on table 4.3 shows that the blood calcium levels of the most respondents included in the low category (<8.6 mg/dl) as much as 57%. Calcium needs will increase in people with sufficient levels of physical activity. The ability of the body to absorb calcium from food decreases with increasing age.<sup>18</sup> Drinking caffeinated drinks such as energy-supplemented drinks every day can cause the body to always urinate (urinating) so that it causes a lot of waste.<sup>19</sup> Regular consumption of high-energy supplements in high doses will reduce blood calcium levels due to the work of caffeine which can increase bone calcium resorption which can cause osteoporosis. In another study in the Omaha United States also found an increase in bone loss in samples that had caffeine intake <300 mg/day.<sup>20</sup>

The activity of marble factory workers is quite high, of course, requires calcium in an amount that is not small. Poor lifestyle such as lack of exercise habits, coffee consumption, energy supplement drinks, age and smoking habits are factors that determine calcium requirements in the body. The need for calcium without being balanced



with the consumption of calcium from food sources will cause the body to take calcium from deposits in bone, along with increasing age, the function of organs decreases one of them is the most storehouse of calcium storage in the body. The best food source to meet calcium needs is in dairy products and derivative products such as cheese, paneer (cottage cheese), green vegetables, anchovy, yeast, and sesame.<sup>21</sup>

## CONCLUSIONS

Based on the results of the study it can be concluded that blood calcium levels in marble factory workers who consumed energy supplement drinks in 2018 showed 10 respondents (33%) had blood calcium levels within normal limits, 17 respondents (57%) had low blood calcium levels and 3 respondents (10%) had very low blood calcium levels.

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