DESCRIPTION

Title of Invention

SLEEPINESS SUPPRESSANT AND FOOD/BEVERAGE FOR SUPPRESSING SLEEPINESS

Technical Field

[0001] The present invention relates to a sleepiness suppressant and a food/beverage for suppressing sleepiness.

Background Art

[0002] Sleepiness felt during work such as job and study causes a deterioration of work efficiency. As a component preventing or eliminating sleepiness, caffeine has been conventionally known. It has been known that caffeine has an action of stimulating the central nervous system to renew mental functioning, and for example, Patent Literature 1 discloses a sleepiness preventive agent containing caffeine and a predetermined component.

Citation List

Patent Literature

[0003] Patent Literature 1: Japanese Unexamined Patent Publication No. 2010-195761

Summary of Invention

Technical Problem

[0004] On the other hand, since there are those who avoid excessive ingestion of caffeine among consumers, a new component having an effect of suppressing sleepiness has been desired.

[0005] An object of an aspect of the present invention is to provide a novel sleepiness suppressant.

Solution to Problem

[0006] The present invention provides, as a first aspect, a sleepiness suppressant containing isomaltulose as an active ingredient.

[0007] The present invention provides, as another aspect, a food/beverage for suppressing sleepiness containing isomaltulose as an active ingredient.

Advantageous Effects of Invention

[0008] According to the aspect of the present invention, it is possible to provide a novel sleepiness suppressant.

Description of Embodiments

[0009] Hereinafter, embodiments of the present invention will be described; however, the present invention is not limited to the following embodiments.

[0010] The term "sleepiness suppressant" in the present specification has at least one or more actions of an action of preliminarily suppressing occurrence of sleepiness and an action of eliminating sleepiness which has occurred. That is, the term "sleepiness suppressant" in the present specification can also be referred to as a "sleepiness eliminating agent".

[0011] A sleepiness suppressant according to an embodiment of the present invention contains isomaltulose.

[0012] Isomaltulose is a disaccharide in which glucose is linked to fructose by α-1,6 linkage and is a structural isomer of sucrose. The isomaltulose is found, for example, in natural honey. Industrially, the isomaltulose is produced by allowing α-glucosyltransferase derived from bacteria such as Protaminobacter rubrum and Serratia plymuthica to act on sucrose.

[0013] The isomaltulose is also called palatinose. Note that, "PALATINOSE" is the registered trademark of Mitsui Sugar Co., Ltd.

[0014] The sleepiness suppressant may be composed of only isomaltulose and may be a composition containing isomaltulose.

[0015] In a case where the sleepiness suppressant is the composition, the isomaltulose contained therein may be contained as isomaltulose single substance and may be contained as a commercially available isomaltulose preparation containing several sugars. The isomaltulose preparation may contain other sugars such as trehalose, other than the isomaltulose.

[0016] The isomaltulose may be contained as crystal particles in the sleepiness suppressant and may be contained as granular particles. The granular particles may be, for example, (spherical) particles which contain an aggregate of a plurality of crystal particles of isomaltulose and amorphous sugar content and in which this sugar content is embedded in the aggregate of crystal particles. Such granular particles can be obtained, for example, by a method of precipitating crystal particles of isomaltulose from a sugar liquid containing isomaltulose and amorphous sugar content and spray-drying this sugar liquid containing the crystal particles. Alternatively, the granular particles containing isomaltulose can also be obtained by a method of applying a shear force to the above-described sugar liquid while heating the sugar liquid to precipitate a crystal nucleus of isomaltulose and cooling a mixture containing this crystal nucleus. The above-described sugar liquid can be obtained, for example, by causing an enzyme to act on sucrose. In this case, the sugar liquid and granular particles thus

obtained contain trehalose, fructose, glucose, sucrose, isomaltose, and the like as amorphous sugar content. The granular particles may be the solid matter described in Japanese Unexamined Patent Publication No. 2012-179045 or the like.

[0017] In a case where the sleepiness suppressant contains crystal particles of isomaltulose, the median diameter of the crystal particles may be, for example, 5 to 50 μm as measured by laser diffraction particle size distribution measurement. In a case where the sleepiness suppressant contains granular particles containing isomaltulose, the median diameter of the granular particles may be, for example, 60 to 300 μm or 80 to 200 μm as measured by laser diffraction particle size distribution measurement. The content ratio of the isomaltulose in the granular particles is, for example, 70% by mass or more and is preferably 70 to 95% by mass.

[0018] In a case where the sleepiness suppressant is the composition containing isomaltulose, the content of the isomaltulose is preferably 15% by mass or more, more preferably 20% by mass or more, and further preferably 25% by mass or more, and is preferably less than 100% by mass and more preferably 70% by mass or less, on the basis of the total amount of the sleepiness suppressant.

[0019] In a case where the sleepiness suppressant is the composition containing isomaltulose, the sleepiness suppressant can contain other raw materials, other than isomaltulose. The other raw materials may be sugars such as trehalose, fructose, glucose, sucrose, isomaltose, and trehalulose. The content of the other raw materials may be larger than 0% by mass and may be 30% by mass or less, on the basis of the total

amount of the sleepiness suppressant.

[0020] The sleepiness suppressant may have any shape of a solid (powder, granules, or the like), a fluid (a solution, a suspension, or the like), a paste, and the like, and may be any preparation of a powder, a pill, fine granules, a tablet, a capsule, a troche, a solution, a suspension agent, and the like.

[0021] In the sleepiness suppressant, parenteral administration such as enteral administration may be carried out, but the sleepiness suppressant is preferably orally administered.

[0022] As an example of the amount of dose to humans, for example, administration is carried out such that the amount of single dose of isomaltulose is preferably 15 g or more, more preferably 20 g or more, and further preferably 25 g or more. Furthermore, administration is carried out such that the amount of single dose of isomaltulose is preferably 50 g or less, more preferably 45 g or less, and further preferably 40 g or less.

[0023] The sleepiness suppressant can be used as a food/beverage (a food composition), a quasi-drug, or a drug. The sleepiness suppressant is preferably used as a food/beverage.

[0024] A food/beverage for suppressing sleepiness according to an embodiment contains isomaltulose as an active ingredient. The food/beverage for suppressing sleepiness according to the present embodiment may be a food/beverage containing the aforementioned sleepiness suppressant.

[0025] The food/beverage for suppressing sleepiness may further contain, in addition to the isomaltulose and the aforementioned other

raw materials, materials which can be used in a food/beverage, a quasi-drug, or a drug. The materials which can be used in a food/beverage, a quasi-drug, or a drug are not particularly limited, and examples thereof include amino acids, proteins, carbohydrates, oils and fats, sweeteners, minerals, vitamins, flavors, excipients, binders, lubricants, disintegrators, emulsifiers, surfactants, bases, dissolving aids, and suspending agents.

[0026] Examples of the proteins include milk casein, whey, soybean protein, wheat protein, and egg white. Examples of the carbohydrates include cornstarch, cellulose, pregelatinized starch, wheat starch, rice starch, and potato starch. Examples of the oils and fats include salad oil, corn oil, soybean oil, safflower oil, olive oil, and palm oil. Examples of the sweeteners include sugars such as glucose, sucrose, fructose, glucose/fructose liquid sugar, and fructose/glucose liquid sugar; sugar alcohols such as xylitol, erythritol, and maltitol; artificial sweeteners such as sucralose, aspartame, saccharin, and acesulfame K; and stevia sweetener. Examples of the minerals include calcium, potassium, phosphorus, sodium, manganese, iron, zinc, magnesium, and salts thereof. Examples of the vitamins include vitamin E, vitamin C, vitamin A, vitamin D, vitamins B, biotin, and niacin. Examples of the excipients include dextrin, starch, lactose, and crystalline cellulose. Examples of the binders include polyvinyl alcohol, gelatin, hydroxypropylmethylcellulose, hydroxypropylcellulose, carboxymethylcellulose sodium, and polyvinylpyrrolidone. Examples of the lubricants include magnesium stearate, calcium stearate, and talc. Examples of the disintegrators include crystalline cellulose, agar,

gelatin, calcium carbonate, sodium hydrogencarbonate, and dextrin. Examples of the emulsifiers or the surfactants include sucrose fatty acid ester, citric acid, lactic acid, glycerin fatty acid ester, polyglyceryl fatty acid ester, sorbitan fatty acid ester, propylene glycol fatty acid ester, and lecithin. Examples of the bases include cetostearyl alcohol, lanolin, and polyethylene glycol. Examples of the dissolving aids include polyethylene glycol, propylene glycol, sodium carbonate, and sodium citrate. Examples of the suspending agents include glyceryl monostearate, polyvinyl alcohol, polyvinylpyrrolidone, methylcellulose, hydroxymethyl cellulose, and sodium alginate. These may be used singly or in combination of two or more kinds thereof.

[0027] Examples of the food/beverage for suppressing sleepiness include beverages such as water, soft drinks, fruit juice drinks, milk beverages, alcoholic beverages, non-alcoholic beverages, sports drinks, and nutritional supplement drinks; and foods such as breads, noodles, rice, soybean curds, dairy products, soy sauces, soybean pastes, and confectionery. The food/beverage may be provided in the form of health foods, foods for specified health use, functional foods, foods with nutrient function claims, supplements, and the like.

Examples

[0028] Hereinafter, the present invention will be specifically described by means of Examples; however, the present invention is not limited to these Examples.

[0029] <Subject>

As subjects, a subject group X and a subject group Y configured by ages and the number of persons as shown in Table 1 were designed

as targets.

[0030] [Table 1]

Group		Whole	Male	Female
X	Number of persons (persons)	20	17	3
	Age (old) (average ± standard deviation)	42.8 ± 7.0	42.8 ± 5.9	43.0 ± 13.9
Y	Number of persons (persons)	20	18	2
	Age (old) (average ± standard deviation)	43.0 ± 8.9	42.6 ± 9.3	47.0 ± 1.4

[0031] <Test method>

A beverage obtained by dissolving 20 g of palatinose in about 180 mL of water was ingested to each subject in the subject group X, and a beverage obtained by dissolving 20 g of glucose in about 180 mL of water was ingested to each subject of the subject group Y. Before 60 minutes of ingestion of the beverage (-60 min), immediately after ingestion (0 min), and after 60 minutes (60 min), 120 minutes (120 min), and 180 minutes (180 min) from ingestion, along with a cognitive functioning test (Cognitrax system), questionnaire on the degree of sleepiness based on the following evaluation criteria was executed.

(Evaluation criteria)

1: Sleepiness is not felt.

2: Normal

3: Sleepiness is slightly felt.

4: Sleepiness is considerably felt.

[0032] Average values and standard deviations of evaluation scores in the subject groups X and Y are shown in Table 2. Furthermore, the amount of change (average value ± standard deviation) in evaluation score when the average value of evaluation scores before 60 minutes of ingestion of the beverage is designated as "0 (zero)" point is together

shown.

[0033] <Statistics analysis>

Statistics analysis was performed for the evaluation scores and the amount of change by U test of Mann-Whitney. Results are shown in Table 2. In Table 2, * or ** indicates that there is a significant difference with respect to the result in -60 min (*: $p < 0.05$, **: $p < 0.01$), and ## indicates that there is a significant difference in comparison between the groups at each time point (##: $p < 0.01$).

[Table 2]

		-60 min	0 min	60 min	120 min	180 min
Evaluation score	X	2.2 ± 0.9	2.4 ± 1.0	2.1 ± 0.6	1.9 ± 0.6	2.0 ± 0.7
	Y	1.9 ± 0.6	2.4 ± 0.9**	2.1 ± 0.8	2.3 ± 0.8*	2.5 ± 0.9*
Amount of change	X	0.0 ± 0.0	0.3 ± 0.6	-0.1 ± 0.9	-0.3 ± 0.6##	-0.2 ± 0.7##
	Y	0.0 ± 0.0	0.5 ± 0.7**	0.2 ± 0.7	0.4 ± 0.6*	0.6 ± 0.8*

CLAIMS

1. Isomaltulose when used as a sleepiness suppressant in a food/beverage.