

DESCRIPTION

Title of Invention

COLLAGEN PEPTIDE-CONTAINING COMPOSITION

Technical Field

[0001] The present invention relates to a collagen peptide-containing composition. Specifically, the present invention relates to a composition containing a collagen peptide, a proteoglycan, a ceramide, and a pectin, and a method of inhibiting generation of an aggregate or a precipitate in a composition containing a collagen peptide, a proteoglycan, and a ceramide.

Background Art

[0002] In recent years, beauty and inhibition of skin aging have attracted attention from women. Collagen peptide has a wide variety of effects such as a skin beautifying effect for improving the skin moisture retention property and skin elasticity, and an effect of improving the blood fluidity, and accordingly, in recent years, collagen peptide has been contained in very many beverages, food products, cosmetics, and the like. In addition, proteoglycan has a capacity of activating the metabolisms of skin and has a high moisture retention property, and thus proteoglycan has been widely recognized among general consumers as a skin beautifying component and has been contained in various types of products. Further, ceramide has been known to have a skin protection action and an effect of preventing rough skin.

[0003] As described above, the collagen peptide, the proteoglycan, and the ceramide have effects related to beauty such as skin moisture retention effect, skin protection effect, and skin flabbiness improving effect. Therefore, these components are often contained in food, beverage, pharmaceutical products, cosmetic products, and the like.

[0004] As a composition containing functional components such as collagen peptide, beverages are often employed. This is because in beverages, the components can be added at a higher content compared with cases of using capsules, tablets, and the like, because beverages can be easily ingested, and because the commercial value can be improved by selecting acidulants, sweeteners, and the like. However, with respect to such a composition containing collagen peptide, a problem of generation of aggregates and precipitates may arise. As techniques for inhibiting generation of aggregates and precipitates in compositions, a plurality of methods has been reported (JP 3416102 B1, JP 5021909 B1).

Summary of Invention

Technical Problem

[0005] In a composition containing collagen peptide and the like, aggregates and precipitates may be generated and the appearance of the composition may degrade. Due to the above-described problem in terms of appearance, problems of degradation of product image and degradation of commercial value may arise concerning compositions containing collagen peptide and the like.

[0006] The problem to be solved by the present invention is

to provide a composition in which generation of aggregates and precipitates is inhibited.

Solution to Problem

[0007] The inventor has industriously carried out researches, and as a result, has found that aggregates and precipitates are generated in compositions containing a collagen peptide, a proteoglycan, and a ceramide and generation of such aggregates and precipitates can be inhibited by addition of a pectin.

[0008] Specifically, the present invention relates to, but not limited to, the following:

- 1). A composition containing a collagen peptide, a proteoglycan, a ceramide, and a pectin.
- 2). The composition according to item 1), which is liquid.
- 3). The composition according to item 1) or 2), wherein a content of the proteoglycan is 0.0001 to 0.05 w/v%.
- 4). The composition according to any one of items 1) to 3), wherein a content of the pectin is 0.05 to 0.8 w/v%.
- 5). The composition according to any one of items 1) to 4), wherein a ratio of the weight of the proteoglycan to the weight of the pectin (proteoglycan weight:pectin weight) is 1:1 to 1:800.
- 6). The composition according to any one of items 1) to 5), wherein a content of the collagen peptide is 1.0 to 25 w/v%.
- 7). The composition according to any one of items 1) to 6), wherein a content of the ceramide is 0.0001 to 0.1 w/v%.
- 8). The composition according to any one of items 2) to 7), wherein the composition has a PH of 2.5 to 5.0.

- 9). The composition according to any one of items 1) to 8), which is for oral use.
- 10). The composition according to any one of items 1) to 9), which is for beautiful skin.
- 11). A method of inhibiting generation of an aggregate or a precipitate in a composition containing a collagen peptide, a proteoglycan, and a ceramide, the method including the step of adding a pectin to the composition.
- 12). The method according to item 11), wherein an amount of the pectin added is 0.05 to 0.8 w/v% based on the total amount of the composition.
- 13). The method according to item 11) or 12), wherein the pectin is added so that a ratio of the weight of the proteoglycan to the weight of the pectin added (proteoglycan weight: pectin weight) is 1:1 to 1:800.
- 14). The composition according to any one of items 1) to 10), wherein the composition is labeled indication of efficacy of the collagen peptide, the proteoglycan, the ceramide, or the pectin.
- 15). The composition according to item 14), wherein the indication is moisture retention, skin protection, prevention of rough skin, or improvement of skin flabbiness.
- 16). A method of producing a composition containing a collagen peptide, a proteoglycan, a ceramide, and a pectin, the method including the steps of: formulating a raw material containing a collagen peptide, a proteoglycan, a ceramide, and a pectin; and sterilizing and filling the formulated composition.
- 17). The method according to item 16), wherein an amount of

the pectin added is 0.05 to 0.8 w/v% based on the total amount of the composition.

18). The method according to item 16) or 17), wherein pectin is added so that a ratio of the weight of the proteoglycan to the weight of the pectin added (proteoglycan weight:pectin weight) is 1:1 to 1:800.

Advantageous Effects of Invention

[0009] According to the present invention, generation of aggregates and precipitates are inhibited by addition of a pectin to a composition containing a collagen peptide, a proteoglycan, and a ceramide.

Description of Embodiments

[0010] 1. Components

1-1. Collagen peptide

Collagen peptide used in the present invention can be obtained by hydrolyzing a collagen or a modified collagen such as gelatin by using an enzyme, an acid, an alkali, and the like, however, its origin and the production method are not particularly limited.

[0011] For example, the collagen or gelatin to be used as the raw material may be derived from bovine, swine, chickens, fish, and the like, and one or two or more of them can be used as the raw material.

[0012] The enzyme used for preparation of a collagen peptide may be an enzyme capable of cleaving peptide bonds of collagen or gelatin, and examples of such an enzyme include collagenase, papain, bromelain, actinidin, ficin, cathepsin, pepsin, chymosin, trypsin, and an enzyme preparation obtained

by mixing the enzymes.

[0013] For the acid, hydrochloric acid, sulfuric acid, and nitric acid can be used, for example. For the alkali, sodium hydroxide, calcium hydroxide, and the like can be used, for example.

[0014] In the present invention, an aqueous solution of hydrolyzed collagen peptide may be used without treatment, or a powder obtained from the aqueous solution of a collagen peptide by drying may be used. In addition, collagen peptide processed by purification usually used for the aqueous solution may be used in the form of an aqueous solution, powder, or the like. The effect of the present invention would not be affected or influenced by which of the above forms is employed.

[0015] The average molecular weight of the collagen peptide is also not particularly limited. However, the in vivo absorbability of a collagen peptide may degrade more as the average molecular weight becomes more and collagen peptide may be easily coagulated at low temperatures depending on the concentration, while if the average molecular weight is small, the in vivo absorbability increases, but bitterness, acidity, and the like, which are unique to peptides, may come out. In consideration of the above points, the average molecular weight of a collagen peptide used in the present invention is preferably 300 to 10,000, more preferably 500 to 9,000, yet more preferably 500 to 6,000. The average molecular weight may be 1,000 to 8,700. The term "average molecular weight" of a collagen peptide herein refers to a weight average molecular

weight, which has a value measured by a Photographic and Gelatin Industries (PAGI) method (gel filtration chromatography method).

[0016] A commercial product may be used as the collagen peptide, and collagen peptide with a preferable molecular weight can be used. Examples of such collagen peptide that can be used include commercial products such as "Nippi peptide PRA" (of Nippi, Inc.), "Water-Soluble Collagen Peptide SS" (of KYOWA HAKKO BIO CO., LTD.) "Collagen Peptide SCP" (of Nitta Gelatin Inc.), and "HACP" (of JELLICE).

[0017] In the present invention, one type of collagen peptide may be used alone or two types or more collagen peptides may be used in combination. The total content of the collagen peptide in the composition of the present invention can be changed according to the purpose of use of the composition containing collagen peptide, and is typically 1.0 to 35 w/v%, preferably 1.0 to 25 w/v%, and more preferably 2.0 to 20 w/v%.

[0018] 1-2. Proteoglycan

"Proteoglycan" is a generic name of a compound in which glycosaminoglycan (mucopolysaccharide) such as chondroitin sulfate and dermatan sulfate is covalently bonded to protein as the core. Proteoglycan exists in connective tissues of animals such as cartilage and skin, and it is a substance necessary for maintaining the structure of the tissues. Examples of the proteoglycan include aggrecan, versican, neurocan, brevican, decorin, biglycan, testican, perlecan, dystroglycan, agrin, and claustrin.

[0019] The type, origin, and production method of the proteoglycan used in the present invention are not particularly limited. For example, any of the above proteoglycan may be used alone, or a combination of two or more of them may be used. Among them, aggrecan is preferable, and aggrecan may be used alone or a combination with other proteoglycan may be used. Animals that can be used as an origin of the proteoglycan is not particularly limited, and proteoglycan derived from animals such as mammals (bovine, swine, and the like), birds (chickens and the like), fish (sharks, salmon, and the like), molluscas (cuttlefish, octopus, and the like), and the like can be used, and further, proteoglycan derived from one or two or more types of animals can be used. Among them, a proteoglycan derived from salmon is preferable and a proteoglycan derived from nasal cartilage of salmon is particularly preferable, and proteoglycan derived from salmon may be used alone or a combination thereof with other proteoglycan may be used. For the production method, any known methods such as an extraction method and the like that uses solvents such as water, acid (acetic acid or the like), alkali (sodium hydroxide, potassium hydroxide, and the like), and alcohols may be used. Purification is not absolutely necessary, and for purification, known methods such as desalination, molecular weight fractionation, and the like may be used. The molecular weight of the proteoglycan, is usually several tens of thousands to several tens of millions. The molecular weight of the proteoglycan used in the present invention is not particularly limited either, and is

preferably 100,000 to 2,000,000.

[0020] In the present invention, an aqueous solution containing a proteoglycan may be used without treatment, or a powder thereof obtained by drying may be used. In addition, proteoglycan processed by purification usually used for the aqueous solution may be used in the form of an aqueous solution, powder, or the like. The effect of the present invention would not be affected or influenced by which of the above forms is employed.

[0021] The total content of the proteoglycan in the composition of the present invention can be changed according to the purpose of use of the composition containing proteoglycan, and is typically 0.0001 to 0.05 w/v%, preferably 0.001 to 0.05 w/v%, more preferably 0.002 to 0.02 w/v%.

[0022] For the method of measuring the content, any known method may be used, and specifically, a gel chromatography molecular weight fractionation method can be used, for example. More specifically, molecular weight fractionation is carried out by using gel chromatography, a proteoglycan standard reagent (Proteoglycan, from Salmon Nasal Cartilage (of Wako Pure Chemical Industries, Ltd.) is used for determination or a dried product of a fraction with the molecular weight of 10,000 or more and for which existence of acid saccharide and protein has been verified is measured. Note that existence of acid saccharide can be verified by a carbazole-sulfuric acid method, and existence of protein can be verified by measuring the absorbance at about 280 nm.

[0023] 1-3. Ceramide

Ceramide is one of sphingolipids constituted by sphingosine and lipid bonded by amide bonding. Various hydrophilic groups are bonded to ceramide to form a primary compound sphingolipid (a sphingolipid containing phosphorous, sulfur, amino acid, and sugar in its molecule). For example, sphingomyelin, in which phosphocholine is bonded to ceramide, is known as a primary sphingophospholipid for animals. A substance in which sugar is bonded to ceramide by glycoside bonding is glycosphingoside. Glycosphingoside exists widely in animals, plants, fungi, and the like, and is represented by cerebroside, in which monosaccharide is bonded to ceramide. As cerebroside, in animals, glucosylceramide constituted by glucose bonded to ceramide and galactosylceramide constituted by galactose bonded to ceramide exist, and in plants and fungi, β -glucosylceramide constituted by glucose bonded to ceramide by β -glycoside bonding exists.

[0024] Ceramide plays a significant role in exerting a skin moisture retention function and a skin barrier function in the horny layer, which is the outermost layer of the skin. In addition, it has been known that ceramide exerts a skin moisture retention effect by building an intercellular lamellar structure in the horny layer and that ceramide has a skin protection action and a rough skin prevention effect exerted by the skin moisture retention effect.

[0025] Ceramide used in the present invention is not particularly limited except that it is a compound having a sphingo-skeleton, and examples of such ceramide include ceramide, ceramide saccharide, sphingophospholipid, and

glycosphingolipid, and ceramide saccharide is particularly preferable. Examples of the ceramide saccharide include glucosylceramide, galactosylceramide, and the like, and glucosylceramide is particularly preferable. Examples of commercial products that can be used as ceramide of the present invention include commercial products such as ORYZA CERAMIDE WSP (of Oryza Oil & Fat Chemical Co., Ltd.) and Milk Ceramide MC-5 SD30 (of MEGMILK SNOW BRAND Co., Ltd).

[0026] Examples of the raw materials of the ceramide used in the present invention include, but not limited to, the skin and the brain of animals such as swine, bovine, horses, and the like; the viscera and the head of fish, molluscas; arthropods; hen eggs; and milk; and plants such as wheat, rye, rice, soybean, corn, millet, konjak, spinach, fungi (Grifola frondosa, Pleurotus cornucopiae, and the like), grape, cherry, Citrus junos, olive, Perilla, shekwasha, prune, and beet sugar. Among them, ceramide derived from rice is preferable. The ceramide used in the present invention may be a natural product or a synthetic product, and the method of extraction and purification of the ceramide is not particularly limited, either. Extracts from animals and plants containing ceramide and preparations containing ceramide with the content ratio increased by various methods may be used, and the purity of the ceramide is not particularly limited, and a highly pure purified ceramide and crude ceramide with a low purity may be used.

[0027] In the present invention, an aqueous solution containing ceramide may be used without treatment, or a powder

thereof obtained by drying may be used. In addition, ceramide processed by purification usually used for the aqueous solution may be used in the form of an aqueous solution, powder, or the like. The effect of the present invention would not be affected or influenced by which of the above forms is employed.

[0028] The total content of the ceramide in the composition of the present invention can be changed according to the purpose of use of the composition containing ceramide, and is typically 0.0001 to 0.1 w/v%, preferably 0.0005 to 0.05 w/v%, more preferably 0.001 to 0.005 w/v%.

[0029] 1-4. Pectin

Pectin is a polymeric carbohydrate, which is particularly contained in leaves, stems, and fruits of plants as a component for bonding cells in the body of plants. Pectin is polygalacturonic acid in which D-galacturonic acid is bonded by α -1,4 bonding as a straight chain, and includes protopectin, pectinic acid, amidated pectin, pectic acid, and the like. Because pectin can be used in acidic food, it is used as a gelling agent for jams and jellies and as a lactoprotein stabilizer for yogurt drinks.

[0030] In a large sense, pectin generally includes high methoxyl (HM) pectins with an esterification degree of 50% or more and low methoxyl (LM) pectins with an esterification degree of less than 50%, and is not particularly limited in the present invention although the gelling conditions and gelling properties for them are different.

[0031] Pectin used in the present invention can be obtained

by extraction from plant materials, and the origin and the production method are not particularly limited. Examples of the pectin that can be used as the raw material include citrus fruits (orange, grapefruit, Citrus junos, lime, lemon, and the like), apples, beet sugar, and the like. Various regions such as leafs, stem, fruits, and fruit skin contain pectin, and the region used in the present invention is not particularly limited, and the whole fruit may be used by selecting a specific region. The breed is not particularly limited. In the present invention, pectin derived from fruit skins of citrus fruits can be preferably used. Examples of commercial products of the pectin that can be used include P-27 (of Nitta Gelatin Inc.), and Neosoft P (of Taiyo Kagaku Co., Ltd.). The production method of the pectin used in the present invention is not particularly limited, and the pectin used in the present invention can be produced from plant raw materials by known methods by performing processes of extraction, filtration, alcohol precipitation, drying, crushing, and the like.

[0032] In the present invention, an aqueous solution containing pectin may be used without treatment, or a powder thereof obtained by drying may be used. In addition, pectin processed by purification usually used for the aqueous solution may be used in the form of an aqueous solution, powder, or the like. The effect of the present invention would not be affected or influenced by which of the above forms is employed.

[0033] The total content of the pectin in the composition

of the present invention can be changed according to the purpose of use of the composition containing pectin, and is typically 0.05 to 0.8 w/v%, preferably 0.05 to 0.5 w/v%, more preferably 0.1 to 0.5 w/v%, yet more preferably 0.1 to 0.3 w/v%.

[0034] 1-5. Ratio of proteoglycan weight to pectin weight

In the present invention, a pectin is added in order to inhibit generation of aggregates and precipitates derived from a collagen peptide, a proteoglycan, and a ceramide in the composition. In the present invention, the ratio of the proteoglycan weight to the pectin weight is not particularly limited, and the ratio of the proteoglycan weight to the pectin weight in the composition (proteoglycan weight:pectin weight) is 1:1 or more, preferably 1:2 or more, more preferably 1:5 or more, and yet more preferably 1:10 or more; and is 1:800 or less, preferably 1:500 or less, more preferably 1:100 or less, yet more preferably 1:50 or less, for example. Specifically, the ratio of the proteoglycan weight to the pectin weight (proteoglycan weight:pectin weight) in the composition is 1:1 to 1:800, preferably 1:2 to 1:500, more preferably 1:5 to 1:100, yet more preferably 1:10 to 1:50.

[0035] 2. Composition

2-1. pH

Generation of aggregates and precipitates derived from a collagen peptide, a proteoglycan, and a ceramide often becomes problematic in low-pH regions. In the composition of the present invention containing a collagen peptide, a

proteoglycan, a ceramide, and a pectin, generation of aggregates and precipitates in low-pH regions can also be inhibited. The pH of the composition of the present invention is not particularly limited, however, considering the above-described characteristic, it is preferable if the pH thereof be low. The low-pH region is typically 2.5 to 5.0, preferably 3.0 to 4.5, more preferably 3.3 to 4.0. In another embodiments, the pH range is 2.5 to 3.4 and preferably 2.8 to 3.2, or is 3.6 to 5.0 and preferably 3.8 to 4.5.

[0036] 2-2. Composition

The present invention relates to a composition containing a collagen a peptide, a proteoglycan, a ceramide, and a pectin. The term "composition" is herein not particularly limited. Examples of such a composition include a solid composition and a liquid composition. The composition is a liquid composition based on water, more preferably an aqueous liquid composition, and examples of such a liquid composition include an aqueous solution, a suspension, and a dispersion. In general, precipitation or separation may occur in a collagen-containing aqueous solution during its storage, and the solution the solution is shaken when it is used to disperse or dissolve the precipitate or separation matter. Accordingly, the composition of the present invention includes compositions in which tolerable precipitation, separation, cloudiness, and the like. In addition, a medium other than water such as alcohol may be included in the composition where necessary.

[0037] 2-3. Plant material

The composition of the present invention may further

include a plant material according to its purpose of use. For the plant material, materials including components with beautifying effects are preferable, and examples of such a plant material include extracts of Piperaceae (e.g., *Piper longum* extract), flax lignan (secoisolariciresinol diglucoside, matairesinol, pinioresinol, isolariciresinol, and the like), flaxseed extract, cherry flower extract, *Lonicera caerulea* extract, ginger extract, cinnamon extract, soy isoflavone, rose flower extract, ceramide derived from plants (wheat, rice embryo, konjak, corn embryo, pineapple), lotus embryo extract, tencha tea extract, *Pyracantha fortuneana* extract, pine bark extract, Maca extract, artichoke leaf extract, *Isodon japonicus* extract, *Hypericum* extract, sage extract, linden extract, *Momordica grosvenori* extract, *Houttuynia cordata* extract, neem leaf extract, gotu kola extract, amla extract, Mangosteen pericarp extract, aronia extract, tochu tea leaf extract, adlay extract, ginseng extract, fruit seed extract, unpolished violet rice extract, *Alpinia zerumbet* leaf extract, Star fruit leaf extract, and aloe extract, and one or two or more of them can be used as the component(s) of the composition of the present invention.

[0038] The *Piper longum* extract, the flaxseed extract, the cherry flower extract, and the *Lonicera caerulea* extract can be obtained by concentrating juice or extract obtained by pressing and solvent extraction from the fruit cluster of *Piper longum*, flaxseed or flaxseed meal, cherry flower, the fruit of *Lonicera caerulea* L. ssp. *edulis* Hulten, respectively. Other extracts can be similarly obtained by from plant raw

materials. For the extraction, solvents such as water, methanol, ethanol, isopropanol can be used. Although not absolutely necessary, purification may be performed.

[0039] 2-4. Other components

The composition of the present invention can include further additional components as long as they would not affect the effect of the present invention. Example of such additional components include vitamins, minerals, nutrient components, perfumes, antioxidants, pigments, preservatives, seasoning, sweeteners, acidulants, pH adjustors, stabilizers, isotonizing agents, emulsifiers, buffers, enrichments, and antiseptics.

[0040] 2-5. Use

Because the composition of the present invention can be expected to exert an excellent beautifying effect derived from the components such as collagen peptide, the composition of the present invention can be provided with explicitly or implicitly indicating that it is used for preventing rough skin, retention of skin moisture, protection of skin, improvement of skin flabbiness, and is extremely useful for subjects of dry skin, rough skin, and flabby skin.

[0041] The composition of the present invention can be provided in a form of food and drink, pharmaceutical product, cosmetics, and the like. If the composition of the present invention is provided as food and drink, the composition can be provided, but not limited to, in the form of health food such as functional food products, supplements, drinking agents (solution and suspension are included), or may be provided in

the form of soft drinks, tea beverages, lactic acid bacteria beverages, and the like.

[0042] The composition of the present invention can be filled in a container. The form of the container is not limited at all, and the composition of the present invention can be filled in sealed containers such as bottles, cans, paper packs, polyethylene terephthalate (PET) bottles, aluminum pouches, plastic pouches and blow-molded containers.

[0043] An indication can be labeled to the container. For the description of the indication, an indication indicating the efficacy of a collagen peptide, a proteoglycan, a ceramide, or a pectin can be given. Examples of such description of the indication include uses such as for moisture retention, for skin protection, for prevention of rough skin, for improvement of flabby skin, and the like. The indication may be given to the composition itself or may be given to the container or package of the composition.

[0044] The drink of the present invention is not particularly limited except that it is produced by using the composition containing a collagen peptide, a proteoglycan, a ceramide, and a pectin, and can be produced by a usual method. Specifically, the composition containing a collagen peptide, a proteoglycan, a ceramide, and a pectin is used as the raw material, and the steps of adding acidulants, sweeteners, and the like to the composition and sterilizing and filling the resulting product are performed to produce the drink. Sterilization conditions may satisfy the conditions provided by the Food Sanitation Law, and various sterilization devices

such as plate type heat exchangers, tube type heat exchangers, pasteurizers can be used. The filling method is not particularly limited, and hot-pack filling, aseptic filling, and the like can be employed.

[0045] 3. Method of inhibiting generation of aggregates or precipitates

The present invention also relates to a method of inhibiting aggregates and precipitates in the composition containing a collagen peptide, a proteoglycan, and a ceramide. The method is characteristic in a point that pectin is added to the composition. The total content of the pectin in the composition is not particularly limited, and is typically 0.05 to 0.8 w/v%, preferably 0.05 to 0.5 w/v%, more preferably 0.1 to 0.5 w/v%, yet more preferably 0.1 to 0.3 w/v%. The ratio of the proteoglycan weight to the pectin weight (proteoglycan weight:pectin weight) in the composition is not particularly limited either, and is typically 1:1 or more, preferably 1:2 or more, more preferably 1:5 or more, yet more preferably 1:10 or more, and is typically 1:800 or less, preferably 1:500 or less, more preferably 1:100 or less, yet more preferably 1:50 or less. Specifically, the ratio of the proteoglycan weight to the pectin weight (proteoglycan weight:pectin weight) in the composition is, but not limited to, 1:1 to 1:800, preferably 1:2 to 1:500, more preferably 1:5 to 1:100, yet more preferably 1:10 to 1:50.

[0046] The method and the timing of adding a pectin to the composition are not particularly limited, as long as pectin is added in the composition at any one or more of the stages of

its production. For example, the other components may be added to, or mixed with, a composition containing a pectin, or a pectin may be added to, or mixed with, a composition containing the other components.

Example

[0047] The present invention will be described more specifically with reference to the following Examples. However, the present invention is not limited to these Examples.

[0048] (Example 1)

In order to evaluate the flavor and the effect of the composition containing a collagen peptide, a proteoglycan, a ceramide, and a pectin for inhibiting precipitation that may occur with time and for inhibiting coagulation of the precipitate, two types of beverages were produced according to the compounds shown in Table 1.

[0049] Specifically, the raw materials except the acidulant were added to water, dissolved therein, then the resulting mixture was adjusted with the acidulant to control the pH to 3.50 ± 0.20 , and the volume determination was performed. Table 1 shows the final compounding amount of the acidulant required for adjustment of the pH and the like. The obtained solution was sterilized by a plate type heat exchanger, the sterilized solution was dispensed in brown bottles by 50 mL each, and the bottles were tightly stopped to obtain beverages (1) and (2). The average molecular weight of the collagen peptide used in the Examples was 3,000, the molecular weight of the proteoglycan derived from nasal cartilage of salmon used in

the Examples was about 450,000, glucosylceramide derived from rice was used as ceramide, Piper longum was used as the plant extract, and HM pectin derived from fruit skins of citrus fruits was used as pectin.

[0050] The beverages were preserved 5°C for 4 months, and the amount of precipitate, the properties of the precipitate, and the flavor were evaluated by visual observation and by sensory tests by 3 expert panelists.

[0051] The compositions and the evaluation results are shown in Table 1. The evaluation criteria are shown in Table 2.

[0052] [Table 1]

	(1)	(2)
Collagen (average molecular weight: 3,000)	100	100
Proteoglycan	0.10	0.10
Acidulant	16	16
Ascorbic acid	3.6	3.6
Sucralose	0.080	0.080
Acesulfame K	0.10	0.10
Erythritol	60	60
Plant Extract	3.7	3.7
Ceramide	0.012	0.012
Pectin	-	3.0
Perfume	Proper amount	Proper amount
	g/1000 ml	
Precipitate amount	++	+
Coagulation of precipitate	Fair	Good
Flavor	Very good	Very good

[0053]

[Table 2]

Evaluation Criteria for Precipitate Amount

-: No precipitate

±: Slight amount of precipitate observed

+×: Small amount of precipitate observed

+: Precipitate observed

+*: Large amount of precipitate observed

++: Precipitate remarkably observed

Evaluation Criteria for Coagulation of Precipitate

Very good: Dispersed without shaking

Good: Dispersed when lightly shaken

Fair: Dispersed when strongly shaken

Poor: Not dispersed even when strongly shaken

Evaluation Criteria for Flavor

5: Pleasant flavor and texture felt

4: Almost no unpleasant flavor or texture felt

3: Slightly unpleasant flavor and texture felt

2: Unpleasant flavor and texture felt

1: Very unpleasant flavor and texture felt

* Average score of 4.5 to 5.0 corresponds to "Very good", 4.0 to 4.4 corresponds to "Good", 3.0 to 3.9 corresponds to "Fair", and less than 3.0 corresponds to "Poor".

[0054] In the beverage (1) to which pectin had not been added, a large amount of precipitate was generated, the coagulation of the precipitate was high, and it was hard to disperse. On the contrary, in the beverage (2) to which pectin had been added, good flavor was kept while the amount of the precipitate was small, the coagulation of the precipitate was low, and it was easy to disperse.

[0055] (Example 2)

In order to evaluate the flavor of and the influence from

the composition containing a collagen peptide, a proteoglycan, a ceramide, and a thickening stabilizer on precipitation that may occur with time and coagulation of the precipitate, beverages were produced according to the compounds shown in Table 3.

[0056] Specifically, the raw materials except the acidulant were added to water, dissolved therein, then the resulting mixture was adjusted with the acidulant to control the pH to 3.50 ± 0.20 , and the volume was determined to be 1,000 ml. Table 3 shows the final compounding amount of the acidulant required for adjustment of the pH and the like. The obtained solution was dispensed in brown bottles by 50 mL each, and then dip sterilization was performed to obtain beverages (3) and (16). Note that the same collagen peptide, proteoglycan, ceramide, plant extract, and pectin as those in Example 1 were used. The beverages were preserved 5°C for 4 days, and the amount of precipitate, the properties of the precipitate, and the flavor and the texture were evaluated by visual observation and by sensory tests by 3 expert panelists.

[0057] The evaluation results are shown in Table 4. The evaluation criteria are shown in Table 2.

[0058] In the beverages (4) and (5) to which pectin had been added, generation of precipitates were remarkably inhibited, the coagulation of the precipitates were low, the beverages were easy to disperse, and the flavor and the texture were excellent.

[0059]

[Table 3]

[illegible][illegible]

[0060] [Table 4]

		Precipitate amount	Coagulation of precipitate	Flavor and texture
No thickener	(3)	++	Fair	Good
Pectin 0.1 w/v%	(4)	±	Very good	Good
Pectin 0.5 w/v%	(5)	±	Very good	Good
Native gellan gum 0.01 w/v%	(6)	±	Good	Poor
Native gellan gum 0.03 w/v%	(7)	-	Fair	Poor
Xanthan gum 0.01 w/v%	(8)	±	Very good	Poor
Xanthan gum 0.05 w/v%	(9)	-	Very good	Poor
Xanthan gum 0.15 w/v%	(10)	-	Good	Poor
Soybean polysaccharides 0.10 w/v%	(11)	+	Good	Good
Soybean polysaccharides 0.50 w/v%	(12)	++	Good	Good
Soybean polysaccharides 0.75 w/v%	(13)	++	Good	Good
Galactomannan 0.10 w/v%	(14)	+	Good	Good
Galactomannan 0.50 w/v%	(15)	+	Good	Good
Galactomannan 0.75 w/v%	(16)	+	Good	Good

[0061] (Example 3)

In order to evaluate the influence of the amounts of a proteoglycan and a pectin to be added on the flavor, the texture, the precipitation occurring with time, and the coagulation of the precipitate, beverages were produced according to the compounds (17) to (26) shown in Table 5 by a method similar to that of Example 2.

[0062] The beverages were preserved at 5°C for 8 days, and the amount of precipitates, the properties of the precipitates, and the flavor were evaluated by visual observation and sensory tests by 3 expert panelists on day 4 and day 8.

[0063] The evaluation results are shown in Table 6. The evaluation criteria are as shown in Table 2.

[0064]

[Table 5]

	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
Collagen (average molecular weight: 3,000)	100	100	100	100	100	100	100	100	100	100
Proteoglycan	0.05	0.05	0.05	0.10	0.10	0.10	0.10	0.50	0.50	0.50
Acidulant	16	16	16	16	16	16	16	16	16	16
Ascorbic acid	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Sucralose	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
Acesulfame K	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Erythritol	60	60	60	60	60	60	60	60	60	60
Plant Extract	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Ceramide	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Pectin	-	0.50	10	-	0.50	3.0	10	0.50	3.0	10
Perfume	Proper amount	Proper amount	Proper amount	Proper amount	Proper amount	Proper amount	Proper amount	Proper amount	Proper amount	Proper amount
	g/1000 ml									

[0065]

[Table 6]

day 4	Pectin 0 w/v%				Pectin 0.05 w/v%				Pectin 0.3 w/v%				Pectin 1.0 w/v%			
		Precipitate amount	Coagulation of precipitate	Flavor and texture		Precipitate amount	Coagulation of precipitate	Flavor and texture		Precipitate amount	Coagulation of precipitate	Flavor and texture		Precipitate amount	Coagulation of precipitate	Flavor and texture
Proteoglycan 0.001 w/v%	(17)	++	Good	Good	(21)	±	Good	Fair	/	/	/	/	(24)	±	Good	Poor
Proteoglycan 0.010 w/v%	(18)	++	Good	Very good	(22)	+	Good	Good	(19)	+×	Good	Very good	(25)	±	Good	Poor
Proteoglycan 0.050 w/v%	/	/	/	/	(23)	+	Good	Good	(20)	+	Good	Good	(26)	+×	Good	Poor

day 8	Pectin 0 w/v%				Pectin 0.05 w/v%				Pectin 0.3 w/v%				Pectin 1.0 w/v%			
		Precipitate amount	Coagulation of precipitate	Flavor and texture		Precipitate amount	Coagulation of precipitate	Flavor and texture		Precipitate amount	Coagulation of precipitate	Flavor and texture		Precipitate amount	Coagulation of precipitate	Flavor and texture
Proteoglycan 0.001 w/v%	(17)	++	Good	-	(21)	+×	Good	-	/	/	/	/	(24)	±	Good	-
Proteoglycan 0.010 w/v%	(18)	++	Good	-	(22)	+	Good	-	(19)	+×	Good	Very good	(25)	±	Good	-
Proteoglycan 0.050 w/v%	/	/	/	/	(23)	+	Good	-	(20)	+	Good	Good	(26)	+×	Good	-

[0066] In the Examples in which proteoglycan was added at the concentration of 0.001 w/v%, the formation of precipitates were greatly inhibited by adding pectin at the concentration of 0.05 w/v%. In the Examples in which proteoglycan was added at the concentration of 0.01 w/v%, inhibition of generation of precipitates was verified at the concentration of added pectin of 0.05 w/v%, and generation of precipitates was remarkably inhibited at the concentration of added pectin of 1.0 w/v%. Further, in the Example in which proteoglycan was added at the concentration of 0.05 w/v%, generation of precipitates tended to be inhibited better as the concentration of added pectin increased. For the flavor and the texture, in the Example in which pectin was added at the concentration of 1.0 w/v%, the viscosity was high, the flavor releasing property was poor, and the texture was heavy.

[0067] (Production Example)

By the similar method as Example 2, beverages were produced according to the compositions (27) and (28) shown in Table 7.

[0068]

[Table 7]

	(27)	(28)
Collagen (average molecular weight: 3,000)	100	100
Proteoglycan	0.50	0.50
Acidulant	16	16
Ascorbic acid	3.6	3.6
Sucralose	0.080	0.080
Acesulfame K	0.10	0.10
Erythritol	60	60
Ceramide	0.012	0.012
Pectin	-	3.0
Perfume	Proper amount	Proper amount
	g/1,000ml	

[0069] In the beverage (27) to which pectin had not been added, generation of precipitates was observed. On the contrary, in the beverage (28) to which pectin had been added, generation of precipitates was remarkably inhibited, the coagulation of the precipitate was low, the precipitate was easy to disperse, and further, excellent flavor and texture were obtained.

Industrial Applicability

[0070] In the present invention, a pectin is added to the composition containing a collagen peptide, a proteoglycan, and a ceramide, generation of aggregates and precipitates can be inhibited. Because pectin is a naturally derived component, the safety is high. Therefore, according to the present invention, an excellent external appearance of the collagen peptide-containing composition can be maintained by an easy and safe method, and thus the present invention has a high industrial applicability.

CLAIMS

1. A liquid composition containing a collagen peptide, a proteoglycan, a ceramide, and a pectin, wherein
a content of the pectin is 0.05 to 0.8 w/v%,
a content of the collagen peptide is 1.0 to 35 w/v%, and
a ratio of the weight of the proteoglycan to the weight of the pectin (proteoglycan weight : pectin weight) is 1:1 to 1:800.
2. The liquid composition according to claim 1, wherein a content of the proteoglycan is 0.0001 to 0.05 w/v%.
3. The liquid composition according to claim 1 or 2, wherein a content of the ceramide is 0.0001 to 0.1 w/v%.
4. The liquid composition according to any one of claims 1 to 3, wherein the composition has a PH of 2.5 to 5.0.
5. The liquid composition according to any one of claims 1 to 4, which is for oral use.
6. The liquid composition according to any one of claims 1 to 5, which is for beautifying skin.

7. A method of inhibiting generation of an aggregate or a precipitate in a liquid composition containing a collagen peptide, a proteoglycan, and a ceramide, the method comprising the step of adding a pectin to the liquid composition, wherein a content of the collagen peptide in the liquid composition is 1.0 to 35 w/v%,

an amount of the pectin added is 0.05 to 0.8 w/v% based on the total amount of the liquid composition, and

the pectin is added so that a ratio of the weight of the proteoglycan to the weight of the pectin added (proteoglycan weight: pectin weight) is 1:1 to 1:800.

8. A method of producing a liquid composition containing a collagen peptide, a proteoglycan, a ceramide, and a pectin, the method comprising the steps of:

formulating a raw material containing a collagen peptide, a proteoglycan, a ceramide, and a pectin, wherein an amount of the pectin added is 0.05 to 0.8 w/v%, an amount of the collagen peptide added is 1.0 to 25 w/v%, and a ratio of the weight of the proteoglycan to the weight of the pectin (proteoglycan weight : pectin weight) is 1:1 to 1:800; and

sterilizing and filling the formulated liquid composition.