effective dosage can be 700 mg/60 kg body weight (bw)/day to 900 mg/60 kg bw/day, for example.

[0007] The other aspect of the present invention provides a use of *Lactobacillus fermentum* GKF3 in the manufacture of a medicament for reducing tobacco addiction, in which the medicament can include but not limited to an effective dosage of the *Lactobacillus fermentum* GKF3 as an active ingredient, and the effective dosage can be 10^{10} colony forming unit (CFU)/60 kg bw/day to 10^{12} CFU/60 kg bw/day, for example.

[0008] According to the aforementioned aspect of the present invention, the use of *Lactobacillus fermentum* GKF3 in the manufacture of a medicament for reducing tobacco addiction, in which the medicament can include but not limited to an effective dosage of the *Lactobacillus fermentum* GKF3 as an active ingredient, and the *Lactobacillus fermentum* GKF3 can be deposited in China General Microbiological Culture Collection Center (CGMCC) with an accession number CGMCC 15203 on January 12, 2018, for example.

[0009] In one embodiment of the present invention, the effective dosage can be 700 mg/60 kg bw/day to 900 mg/60 kg bw/day, for example. In one embodiment of the present invention, the effective dosage can be 10^{10} colony forming unit (CFU)/60 kg bw/day to 10^{12} CFU/60 kg bw/day, for example. In one embodiment of the present invention, the *Lactobacillus fermentum* GKF3 reduces ~~reduces an~~the total amount of nicotine metabolites in urine of the smoking subject. In one embodiment of the present invention, the nicotine metabolites can include but not limited to cotinine and/or trans-3-hydroxycotinine. In one embodiment of the present invention, the total amount of the nicotine

metabolites can be reduced by 10 ng/mL to 1,100 ng/mL, for example. In one embodiment of the present invention, the medicament is to be daily administered to the smoking subject for an administration time, and the administration time can be 25 days to 30 days, for example.

[0010] According to another aforementioned aspect of the present invention, an use of *Lactobacillus fermentum* GKF3 in the manufacture of a medicament for reducing tobacco addiction is provided. The medicament can include but not limited to an effective dosage of the *Lactobacillus fermentum* GKF3 as an active ingredient, and the *Lactobacillus fermentum* GKF3 is deposited in China General Microbiological Culture Collection Center (CGMCC) with an accession number CGMCC 15203 on January 12, 2018, and the effective dosage can be 700 mg/60 kg bw/day to 900 mg/60 kg bw/day, for example.

[0011] In one embodiment of the present invention, the *Lactobacillus fermentum* GKF3 reduces the tobacco addiction by reducing ~~an~~the total amount of nicotine metabolites in urine of the smoking subject. In one embodiment of the present invention, the nicotine metabolites can include but not limited to cotinine and/or trans-3-hydroxycotinine. In one embodiment of the present invention, the total amount of the nicotine metabolites can be reduced by 10 ng/mL to 1,100 ng/mL, for example. In one embodiment of the present invention, the medicament is to be daily administered to the smoking subject for an administration time, and the administration time is 25 days to 30 days, for example.

[0012] According to the other aforementioned aspect of the present invention, an use of *Lactobacillus fermentum* GKF3 in the manufacture of a medicament for reducing tobacco addiction is provided. The medicament can include but

not limited to an effective dosage of the *Lactobacillus fermentum* GKF3 as an active ingredient, the *Lactobacillus fermentum* GKF3 is deposited in China General Microbiological Culture Collection Center (CGMCC) with an accession number CGMCC 15203 on January 12, 2018, and the effective dosage can be 10^{10} CFU/60 kg bw/day to 10^{12} CFU/60 kg bw/day, for example.

[0013] In one embodiment of the present invention, the medicament is to be daily administered to the smoking subject for an administration time, and the administration time can be 25 days to 30 days, for example. In one embodiment of the present invention, the *Lactobacillus fermentum* GKF3 reduces ~~an~~the total amount of nicotine metabolites in urine of the smoking subject. In one embodiment of the present invention, the nicotine metabolites can include but not limited to cotinine and/or trans-3-hydroxycotinine. In one embodiment of the present invention, the total amount of the nicotine metabolites can be reduced by 10 ng/mL to 1,100 ng/mL, for example.

[0014] By applying the use of *Lactobacillus fermentum* GKF3 in the manufacture of a medicament for reducing tobacco addiction, the smoking amount of the smoking subject is reduced without causing withdrawal symptoms of nicotine, indicating that the oral composition containing *Lactobacillus fermentum* GKF3 is able to reduce tobacco addiction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The invention can be more fully understood by reading the followed detailed description of the embodiment, with reference made to the accompanying drawings as follows:

reduced, in which the administration time can be 25 days to 30 days, for example.

[0025] The aforementioned “smoking subject” may interchangeably refer to a current smoker. According to the international definition, the current smoker is one that has smoked over 100 cigarettes (5 packs) up to now and admits tobacco products within 30 days.

[0026] One of the technical features of the present invention is that the effect of *Lactobacillus fermentum* GKF3 on reducing tobacco addiction is evaluated by combining objective physiological test values and a subjective cognition scale. In details, the aforementioned “reducing tobacco addiction” objectively refers to reducing a smoking amount (for example, the frequency and/or amount of smoking). On the other hand, the aforementioned “reducing tobacco addiction” subjectively refers to the condition that the smoking subject has no withdrawal symptoms of nicotine when the amount of nicotine in blood of the smoking subject decreases as the smoking amount reduces.

[0027] In detail, the smoking amount of the smoking subject can be determined by the nicotine metabolites in the urine, since the nicotine metabolites can be detected in the urine of the smoking subject 7 days to 10 days after a smoking subject smokes, and ~~an~~the total amount of the nicotine metabolites is positively correlated to the smoking amount. Therefore, the smoking amount of the smoking subject is determined to reduce when the total amount of nicotine metabolites in the urine of the smoking subject are reduced by more than a preset concentration, in which the preset concentration is reduced by 10 ng/mL. The

nicotine metabolites can include but not limited to cotinine and/or trans-3-hydroxycotinine.

[0028] As mentioned above, the effect of reducing tobacco addiction can be evaluated by the reduced total amount of nicotine metabolites in the urine of a smoking subject after the smoking subject is daily administered with the GKF3 oral composition. Furthermore, the effect of reducing tobacco addiction can also be evaluated by the percentage of the smoking subjects with reduced tobacco addiction, in which the percentage of the smoking subjects with reduced tobacco addiction is defined as the percentage of the smoking subject numbers having reduced smoking amount over the all smoking subject numbers. The reduced smoking amount refers to a difference by comparison of the total amount of nicotine metabolites in the urine before and after the administration of the GKF3 in the same smoking subject. Typically, ~~more than 10 ng/mL of the difference of~~ the total amount of nicotine metabolites reduced by more than 10 ng/mL in the urine can be determined as the reduced tobacco addiction of smoking subject.

[0029] In one embodiment, the withdrawal symptoms of nicotine can be evaluated by CES-D (the center for epidemiologic studies depression scale) designed by the National Institute of Mental Health, for example. CES-D is a common depression scale for epidemiology, which employs CES-D total scores to quantize the frequency of depressed mood subjectively evaluated by a smoking subject. A smoking subject with a reduced smoking amount is determined to have withdrawal symptoms of nicotine when the smoking subject has an increased CES-D total score. In contrast, the corresponding smoking

subject. Thus, the *Lactobacillus fermentum* GKF3 was proved to be able to reduce tobacco addiction.

[0049] The ~~a~~ percentage of the subjects with reduced tobacco addiction in the experimental treatment group was obtained by calculating the percentage of the subjects whose total amount of the nicotine metabolites in the urine reduced more than 10 ng/mL after the subjects were subjected to the experimental treatment over all the subjects. Similarly, the percentage of the subjects with reduced tobacco addiction in the control treatment group was obtained by calculating the percentage of the subjects whose total amount of the nicotine metabolites in the urine was reduced by more than 10 ng/mL after the subjects were subjected to the control treatment over all the subjects.

[0050] FIG. 3 was a bar char illustrating the percentage (%) of the subjects with reduced tobacco addiction in different treatment groups according to an embodiment of the present invention, in which the horizontal axis showed the control treatment group and the experimental treatment group respectively from left to right, and the longitudinal axis showed the percentage of the subjects with reduced tobacco addiction (unit: %). As shown in FIG. 3, the percentage of the subjects with reduced tobacco addiction in the experimental treatment group was 67% (30/45 subjects), which was 31% higher than that (36%, 16/45 subjects) of the subjects in the control treatment group, proving that the *Lactobacillus fermentum* GKF3 reduces the tobacco addiction.

EXAMPLE 3. Evaluation of the effect of *Lactobacillus fermentum* GKF3 in reducing tobacco addiction by using a cognition scale.

WHAT is CLAIMED IS:

1. Use of *Lactobacillus fermentum* GKF3 in the manufacture of a medicament for reducing tobacco addiction, wherein the medicament ~~comprises~~is consisted of an effective dosage of the *Lactobacillus fermentum* GKF3 as an active ingredient, ~~and~~ the *Lactobacillus fermentum* GKF3 is deposited in China General Microbiological Culture Collection Center (CGMCC) with an accession number CGMCC 15203 on January 12, 2018, the effective dosage is 700 mg/60 kg body weight (bw)/day to 900 mg/60 kg bw/day, the medicament is to be administered daily for at least 25 days to a smoking subject excluding one taking a nicotine related replacement therapy, and a total amount of nicotine metabolites of the smoking subject is reduced by 10 ng/mL to 1,100 ng/mL.

2. The use according to claim 1, wherein the ~~effective dosage is 700 mg/60 kg body weight (bw)/day to 900 mg/60 kg bw/day~~smoking subject is to be having smoked over 100 cigarettes.

3. The use according to claim 1, wherein the ~~effective dosage is 10^{10} colony forming unit (CFU)/60 kg bw/day to 10^{12} CFU/60 kg bw/day~~smoking subject is to be having smoked within 30 days.

~~4. The use according to claim 1, wherein the *Lactobacillus fermentum* GKF3 reduces an total amount of nicotine metabolites in urine of the smoking subject.~~

~~5~~4. The use according to claim 4~~1~~, wherein the nicotine metabolites comprise cotinine and/or trans-3-hydroxycotinine.

~~6. The use according to claim 4, wherein the total amount of the nicotine metabolites is 10 ng/mL to 1,100 ng/mL.~~

~~7~~5. The use according to claim 1, wherein the medicament is to be ~~daily~~ administered to the smoking subject for ~~an administration time, and the administration time is~~ 25 days to 30 days.

~~8~~6. Use of *Lactobacillus fermentum* GKF3 in the manufacture of a medicament for reducing tobacco addiction, wherein the medicament ~~comprises~~is consisted of an effective dosage of the *Lactobacillus fermentum* GKF3 as an active ingredient, the *Lactobacillus fermentum* GKF3 is deposited in China General

Microbiological Culture Collection Center (CGMCC) with an accession number CGMCC 15203 on January 12, 2018, ~~and~~ the effective dosage is 700 mg/60 kg bw/day to 900 mg/60 kg bw/day, the medicament is to be administered daily for at least 25 days to a smoking subject excluding one taking a nicotine related replacement therapy, and a total amount of nicotine metabolites of the smoking subject is reduced by 10 ng/mL to 1,100 ng/mL.

~~9. The use according to claim 8, wherein the *Lactobacillus fermentum* GKF3 reduces the tobacco addiction by reducing an total amount of nicotine metabolites in urine of the smoking subject.~~

~~10~~7. The use according to claim ~~9~~6, wherein the nicotine metabolites comprise cotinine and/or trans-3-hydroxycotinine.

~~11. The use according to claim 9, wherein the total amount of the nicotine metabolites is 10 ng/mL to 1,100 ng/mL.~~

~~12~~8. The use according to claim ~~8~~3, wherein the medicament is to be ~~daily~~ administered to the smoking subject for ~~an administration time, and the administration time is~~ 25 days to 30 days.

~~13~~9. Use of *Lactobacillus fermentum* GKF3 in the manufacture of a medicament for reducing tobacco addiction, wherein the medicament ~~comprises~~is consisted of an effective dosage of the *Lactobacillus fermentum* GKF3 as an active ingredient, ~~and~~ the *Lactobacillus fermentum* GKF3 is deposited in China General Microbiological Culture Collection Center (CGMCC) with an accession number CGMCC 15203 on January 12, 2018, ~~and~~ the effective dosage is 10^{10} CFU/60 kg bw/day to 10^{12} CFU/60 kg bw/day, the medicament is to be administered daily for at least 25 days to a smoking subject excluding one taking a nicotine related replacement therapy, and a total amount

of nicotine metabolites of the smoking subject is reduced by 10 ng/mL to 1,100 ng/mL.

~~14. The use according to claim 13, wherein the medicament is to be daily administered to the smoking subject for an administration time.~~

~~15~~10. The use according to claim ~~13~~9, wherein the ~~administration time is~~medicament is to be administered for 25 days to 30 days.

~~16. The use according to claim 13, wherein the *Lactobacillus fermentum* GKF3 reduces an total amount of nicotine metabolites in urine of the smoking subject.~~

~~17~~11. The use according to claim ~~16~~9, wherein the nicotine metabolites comprise cotinine and/or trans-3-hydroxycotinine.

~~18. The use according to claim 16, wherein the total amount of the nicotine metabolites is 10 ng/mL to 1,100 ng/mL.~~

USE OF *LACTOBACILLUS FERMENTUM* GKF3 IN THE MANUFACTURE OF MEDICAMENT FOR REDUCING TOBACCO ADDICTION

ABSTRACT OF THE DISCLOSURE

A method of reducing tobacco addiction in a smoking subject with *Lactobacillus fermentum* GKF3, including daily administering an oral composition containing the *Lactobacillus fermentum* GKF3 to the smoking subject, in which the oral composition reduces ~~an~~the total amount of the nicotine metabolites in urine.

FIG. 3