European Food Safety Authority

EFSA Journal 2015;13(1):3952

SCIENTIFIC OPINION

Scientific Opinion on the substantiation of a health claim related to Teestar™, a fenugreek seed extract standardised by its content of galactomannan, and a reduction of post-prandial glycaemic responses pursuant to Article 13(5) of Regulation (EC) No 1924/2006[1]

EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA)[2,3]

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

Following an application from Avesthagen Limited, submitted for authorisation of a health claim pursuant to Article 13(5) of Regulation (EC) No 1924/2006 via the Competent Authority of France, the EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA) was asked to deliver an opinion on the scientific substantiation of a health claim related to Teestar™ and a reduction of post-prandial glycaemic responses. The Panel considers that the food, Teestar™, a fenugreek seed extract standardised by its content of galactomannan, is sufficiently characterised. A reduction of post-prandial glycaemic responses might be a beneficial physiological effect. The applicant submitted one unpublished and eight published human studies as being pertinent to the health claim. No conclusions can be drawn from the eight published studies, as they were not carried out with Teestar™ or any other fenugreek seed extract which complied with the specifications of the food which is the subject of the claim. In one unpublished study, the consumption of Teestar™ did not lead to a reduction in mean peak post-prandial blood glucose concentrations, which was the primary endpoint of the study. The Panel concludes that a cause and effect relationship has not been established between the consumption of Teestar™, a fenugreek seed extract standardised by its content of galactomannan, and a reduction of post-prandial glycaemic responses.

KEY WORDS

Teestar™, *Trigonella foenum-graecum*, fenugreek, post-prandial glycaemic responses, health claims

[1] On request from the Competent Authority of France following an application by Avesthagen Limited, Question No EFSA-Q-2014-00153, adopted on 11 December 2014.

[2] Panel members: Carlo Agostoni, Roberto Berni Canani, Susan Fairweather-Tait, Marina Heinonen, Hannu Korhonen, Sébastien La Vieille, Rosangela Marchelli, Ambroise Martin, Androniki Naska, Monika Neuhäuser-Berthold, Grażyna Nowicka, Yolanda Sanz, Alfonso Siani, Anders Sjödin, Martin Stern, Sean (J.J.) Strain, Inge Tetens, Daniel Tomé, Dominique Turck and Hans Verhagen. Correspondence: nda@efsa.europa.eu

[3] Acknowledgement: The Panel wishes to thank the members of the Working Group on Claims: Carlo Agostoni, Jean-Louis Bresson, Susan Fairweather-Tait, Marina Heinonen, Ambroise Martin, Hildegard Przyrembel, Yolanda Sanz, Alfonso Siani, Anders Sjödin, Sean (J.J.) Strain, Inge Tetens, Hendrik Van Loveren, Hans Verhagen and Peter Willatts for the preparatory work on this scientific opinion.

Suggested citation: EFSA NDA Panel (EFSA Panel on Dietetic Products, Nutrition and Allergies), 2015. Scientific Opinion on the substantiation of a health claim related to Teestar™, a fenugreek seed extract standardised by its content of galactomannan, and a reduction of post-prandial glycaemic responses pursuant to Article 13(5) of Regulation (EC) No 1924/2006. EFSA Journal 2015;13(1):3952, 9 pp. doi:10.2903/j.efsa.2015.3952

Available online: www.efsa.europa.eu/efsajournal

SUMMARY

Following an application from Avesthagen Limited, submitted for authorisation of a health claim pursuant to Article 13(5) of Regulation (EC) No 1924/2006 via the Competent Authority of France, the EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA) was asked to deliver an opinion on the scientific substantiation of a health claim related to Teestar™ and a reduction of post-prandial glycaemic responses.

The scope of the application was proposed to fall under a health claim based on newly developed scientific evidence. The application included a request for the protection of proprietary data.

The food that is the subject of the health claim is Teestar™, which is a fenugreek (*Trigonella foenum-graecum* L.) seed extract standardised by its content (i.e. 70 ± 5 %) of galactomannan. The Panel considers that the food, Teestar™, a fenugreek seed extract standardised by its content of galactomannan, is sufficiently characterised.

The claimed effect proposed by the applicant is "reduction of post-prandial blood glucose levels". The target population proposed by the applicant is "healthy adults with or without impaired glycaemic pre-obese and obese conditions". The Panel considers that a reduction of post-prandial glycaemic responses (as long as post-prandial insulinaemic responses are not disproportionally increased) might be a beneficial physiological effect.

The applicant submitted one unpublished and eight published human studies as being pertinent to the health claim.

The eight published human studies were not carried out with Teestar™ or any other fenugreek seed extract which complied with the specifications of the food which is the subject of the claim. The Panel considers that no conclusions can be drawn from these studies for the scientific substantiation of the claim.

In one unpublished, open-label, randomised, placebo-controlled, three-arm parallel study, 27 subjects consumed, for seven consecutive days, Teestar™ capsules, Teestar™ crackers or a placebo prior to breakfast and dinner. The primary endpoint was a reduction in the mean peak post-prandial blood glucose concentrations. Compared with the placebo, consumption of Teestar™ did not lead to a reduction in mean peak post-prandial blood glucose concentrations after breakfast or dinner. As secondary endpoints of the study, mean blood glucose concentrations at the time points 60, 90 and 120 minutes after the start of breakfast and dinner were compared between the Teestar™ groups and the placebo group. The time points were treated as independent in the analysis, and no correction for multiple comparisons was carried out. The Panel considers that no conclusions can be drawn from the secondary analysis of the study. The Panel considers that this study does not provide evidence for an effect of the consumption of Teestar™ on a reduction of post-prandial glycaemic responses.

The Panel notes that in the absence of evidence for an effect of Teestar™ on post-prandial glycaemic responses in humans, animal studies on potential mechanisms do not provide support for the scientific substantiation of the claim.

The Panel concludes that a cause and effect relationship has not been established between the consumption of Teestar™, a fenugreek seed extract standardised by its content of galactomannan, and a reduction of post-prandial glycaemic responses.

TABLE OF CONTENTS

BACKGROUND

Regulation (EC) No 1924/2006[4] harmonises the provisions that relate to nutrition and health claims, and establishes rules governing the Community authorisation of health claims made on foods. As a rule, health claims are prohibited unless they comply with the general and specific requirements of this Regulation, are authorised in accordance with this Regulation, and are included in the lists of authorised claims provided for in Articles 13 and 14 thereof. In particular, Article 13(5) of this Regulation lays down provisions for the addition of claims (other than those referring to the reduction of disease risk and to children's development and health) which are based on newly developed scientific evidence, or which include a request for the protection of proprietary data, to the Community list of permitted claims referred to in Article 13(3).

According to Article 18 of this Regulation, an application for inclusion in the Community list of permitted claims referred to in Article 13(3) shall be submitted by the applicant to the national competent authority of a Member State, which will make the application and any supplementary information supplied by the applicant available to the European Food Safety Authority (EFSA).

STEPS TAKEN BY EFSA

- The application was received on 04/03/2014.
- The scope of the application was proposed to fall under a health claim based on newly developed scientific evidence. The application included a request for the protection of proprietary data.
- On 19/05/2014, during the validation process of the application, EFSA sent a request to the applicant to provide missing information.
- On 19/06/2014, EFSA received the missing information as submitted by the applicant.
- The scientific evaluation procedure started on 19/06/2014.
- On 18/09/2014, the NDA Panel agreed on a list of questions for the applicant to provide additional information to accompany the application and the clock was stopped on 29/09/2014, in compliance with Article 18(3) of Regulation (EC) No 1924/2006.
- On 14/10/2014, EFSA received the applicant's reply (which was made available to EFSA in electronic format on 13/10/2014) and the clock was restarted, in compliance with Article 18(3) of Regulation (EC) No 1924/2006.
- During its meeting on 11/12/2014, the NDA Panel, having evaluated the data submitted, adopted an opinion on the scientific substantiation of a health claim related to Teestar™, a fenugreek seed extract standardised by its content of galactomannan, and a reduction of post-prandial glycaemic responses.

TERMS OF REFERENCE

EFSA is requested to evaluate the scientific data submitted by the applicant in accordance with Article 16(3) of Regulation (EC) No 1924/2006. On the basis of that evaluation, EFSA will issue an opinion on the scientific substantiation of a health claim related to: Teestar™, a fenugreek seed extract standardised by its content of galactomannan, and a reduction of post-prandial glycaemic responses.

[4] Regulation (EC) No 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims made on foods. OJ L 404, 30.12.2006, p. 9–25.

EFSA DISCLAIMER

The present opinion does not constitute, and cannot be construed as, an authorisation for the marketing of Teestar™, a positive assessment of its safety, nor a decision on whether Teestar™ is, or is not, classified as a foodstuff. It should be noted that such an assessment is not foreseen in the framework of Regulation (EC) No 1924/2006.

It should also be highlighted that the scope, the proposed wording of the claim, and the conditions of use as proposed by the applicant may be subject to changes, pending the outcome of the authorisation procedure foreseen in Article 18(4) of Regulation (EC) No 1924/2006.

INFORMATION PROVIDED BY THE APPLICANT

Applicant's name and address: Avesthagen Limited, Avesthagen One, No 7/6 Brunton Road, Bangalore 560025, Karanataka, India.

The application includes a request for the protection of proprietary data, in accordance with Article 21 of Regulation (EC) No 1924/2006.

Food/constituent as stated by the applicant

According to the applicant, the food that is the subject of the health claim is Teestar™, which is a standardised fenugreek (*Trigonella foenum-graecum* L.) fibre extract containing 70 ± 5 % galacto-mannan.

Health relationship as claimed by the applicant

According to the applicant, consumption of Teestar™ prior to meals leads to a reduction of post-prandial blood glucose levels.

The proposed mechanism is that in the presence of water the galactomannan in Teestar™ forms a colloidal-type suspension in the stomach and small intestine, thereby increasing the viscosity in the gastrointestinal tract and slowing down gastrointestinal transit of food and glucose absorption through intestinal microvilli.

Wording of the health claim as proposed by the applicant

The applicant has proposed the following wording for the health claim: "Teestar™ lowers blood glucose levels".

Specific conditions of use as proposed by the applicant

The applicant has proposed an intake of 1 g Teestar™ twice a day 20 minutes prior to consumption of a meal. Teestar™ can be consumed in the form of capsules, crackers or as a powder (to be dissolved in water or milk).

The target population proposed by the applicant are healthy adults with or without impaired glycaemic pre-obese and obese conditions.

According to the applicant, children and teenagers up to 18 years of age, adults with malnutrition, underweight adults and pregnant women should not consume Teestar™, in order "to avoid any imbalance in calorie input and calorie requirement".

ASSESSMENT

1. Characterisation of the food/constituent

The food that is the subject of the health claim is Teestar™, which is a standardised fenugreek (*Trigonella foenum-graecum* L.) seed extract containing 70 ± 5 % galactomannan.

Teestar™ is extracted from the seeds of fenugreek (*Trigonella foenum-graecum* L.) by water and alcohol extraction and is standardised by its content of galactomannan (i.e. 70 ± 5 %). Teestar™ contains 19-21 % protein and 3-5 % moisture.

Galactomannan is a water-soluble type of fibre. It is a polysaccharide which is composed of a backbone of D-mannose units (linked by β-1,4-glycosidic bonds) with D-galactose moieties linked (by α-1,6-glycosidic bonds) to the mannose units. The ratio of mannose to galactose in galactomannan from fenugreek is 1:1. The average molecular weight of the galactomannan is about 217 kDa. Galactomannan can be measured in foods by established methods.

An overview of the manufacturing process, batch-to-batch variability and stability data were provided. Teestar™ is manufactured in the form of capsules, crackers and as a powder.

The Panel considers that the food, Teestar™, a fenugreek seed extract standardised by its content of galactomannan, which is the subject of the health claim, is sufficiently characterised.

2. Relevance of the claimed effect to human health

The claimed effect proposed by the applicant is "reduction of post-prandial blood glucose levels". The target population proposed by the applicant is "healthy adults with or without impaired glycaemic pre-obese and obese conditions".

The elevation of blood glucose concentrations after consumption of a food and/or meal, i.e. post-prandial glycaemia, is a normal physiological response which varies in magnitude and duration, and which may be influenced by the chemical and physical nature of the food or meal consumed, as well as by individual factors (Venn and Green, 2007). Decreasing post-prandial glycaemic responses, as long as post-prandial insulinaemic responses are not disproportionally increased, may, for example, be beneficial to individuals with impaired glucose tolerance. Impaired glucose tolerance is common in the general population of adults.

The Panel considers that a reduction of post-prandial glycaemic responses (as long as post-prandial insulinaemic responses are not disproportionally increased) might be a beneficial physiological effect.

3. Scientific substantiation of the claimed effect

The applicant performed a literature search in PubMed, Science Direct, the WIPO (World Intellectual Property Organization) and Google, using the search terms "fenugreek", "*Trigonella foenum graecum*", "diabetes", "efficacy", "safety", "preclinical", "clinical", "glucose", "galactomannan" and "glycaemic control". In addition, references of key articles were hand searched. The search was limited to studies published from 1980-2011 in the English language. Studies were excluded if they were primarily concerned with diabetic complications such as neuropathy, nephropathy or retinopathy, or if they were available only as abstracts.

The applicant submitted one unpublished and eight published human studies as being pertinent to the health claim.

The eight published human studies (Sharma, 1986; Sharma and Raghuram, 1990; Raghuram et al., 1994; Sharma et al., 1996a, b; Bordia et al., 1997; Abdel-Barry et al., 2000; Mitra and Bhattacharya, 2006) were not carried out with Teestar™ or any other fenugreek seed extract which complied with the specifications indicated in section 1 but rather with whole or powdered fenugreek seeds, fenugreek leaves, an extract from fenugreek leaves, fenugreek gum isolate or fenugreek composites. The Panel considers that no conclusions can be drawn from these studies for the scientific substantiation of the claim.

One study (Avesthagen Limited, 2008, unpublished, claimed as proprietary by the applicant) was carried out with Teestar™ (in the form of capsules and crackers). The study was an open-label, randomised, placebo-controlled, three-arm parallel study in 27 healthy male subjects who consumed Teestar™ capsules (n = 9), Teestar™ crackers (n = 9) (both providing 1 g galactomannan per portion)

or a placebo (1 g milk casein in capsules; n = 9) 20 minutes prior to breakfast and dinner for seven consecutive days. The Panel notes that the intervention with the crackers did not have an appropriate control matched for the macronutrient content of the crackers. Power calculations indicated that eight subjects per study group would yield a power of 95 % to detect a difference in peak blood glucose concentrations of 0.5 mmol/L, at a significance level (two-sided) of 5 % and assuming a standard deviation of 0.15 mmol/L. In order to assess blood glucose concentrations, blood samples were taken every day before (i.e. at baseline) and at 15, 30, 45, 60, 90 and 120 minutes after the start of breakfast and dinner (which contained 100 g carbohydrate per meal). In addition, serum insulin concentrations were measured in nine subjects (randomly selected among the 27 study subjects) on day 2 and day 7. The primary endpoint of the study was a reduction in the mean peak post-prandial blood glucose concentrations between the time points -20 minutes and 120 minutes in the Teestar™ groups compared with the placebo group after breakfast and dinner. A t-test was used for the statistical analysis. Compared with the placebo, consumption of Teestar™ did not lead to a reduction in mean peak post-prandial blood glucose concentrations after breakfast or dinner. The applicant was requested to provide a statistical analysis of the incremental areas under the blood glucose and blood insulin curves (0-120 minutes), applying standard methodology, following consumption of Teestar™ in comparison with placebo. No such analysis was provided. As secondary endpoints of the study, mean blood glucose concentrations at the time points 60, 90 and 120 minutes after the start of breakfast and dinner were compared between the Teestar™ groups and the placebo group, using a t-test and choosing a significance level of $p \leq 0.1$. The time points were treated as independent in the analysis, and no correction for multiple comparisons was carried out. The Panel considers that no conclusions can be drawn from the secondary analysis of the study. The Panel considers that this study does not provide evidence for an effect of the consumption of Teestar™ on a reduction of post-prandial glycaemic responses.

The Panel notes that in the absence of evidence for an effect of Teestar™ on post-prandial glycaemic responses in humans, animal studies on potential mechanisms do not provide support for the scientific substantiation of the claim.

The Panel concludes that a cause and effect relationship has not been established between the consumption of Teestar™, a fenugreek seed extract standardised by its content of galactomannan, and a reduction of post-prandial glycaemic responses.

CONCLUSIONS

On the basis of the data presented, the Panel concludes that:

- The food, Teestar™, a fenugreek seed extract standardised by its content of galactomannan, which is the subject of the health claim, is sufficiently characterised.
- The claimed effect proposed by the applicant is “reduction of post-prandial blood glucose levels”. The target population proposed by the applicant is “healthy adults with or without impaired glycaemic pre-obese and obese conditions”. A reduction of post-prandial glycaemic responses might be a beneficial physiological effect.
- A cause and effect relationship has not been established between the consumption of Teestar™, a fenugreek seed extract standardised by its content of galactomannan, and a reduction of post-prandial glycaemic responses.

DOCUMENTATION PROVIDED TO EFSA

Health claim application on Teestar™ and a reduction of post-prandial glycaemic responses pursuant to Article 13(5) of Regulation (EC) No 1924/2006 (EFSA-Q-2014-00153, Claim serial No: 0414_FR). March 2014. Submitted by Avesthagen Limited.

REFERENCES

Abdel-Barry JA, Abdel-Hassan IA, Jawad AM and al-Hakiem MHH, 2000. Hypoglycaemic effect of aqueous extract of the leaves of *Trigonella foenum-graecum* in healthy volunteers. Eastern Mediterranean Health Journal, 6, 83–88.

Avesthagen Limited, 2008 (unpublished, claimed as proprietary by the applicant). An open label, placebo-controlled, parallel-group, three arm (test 1, test 2 and placebo), multiple dose, randomized study to evaluate the safety and efficacy of different formulations of Teestar™ in healthy human adult male subjects. Manipal, India, Clinical study report No 136-08.

Bordia A, Verma SK and Srivastava KC, 1997. Effect of ginger (*Zingiber officinale* Rosc.) and fenugreek (*Trigonella foenumgraecum* L.) on blood lipids, blood sugar and platelet aggregation in patients with coronary artery disease. Prostaglandins, Leukotrienes and Essential Fatty Acids, 56, 379–384.

Mitra A and Bhattacharya D, 2006. Dose-dependent effects of Fenugreek composite in diabetes with dyslipidaemia. Internet Journal of Food Safety, 8, 49–55.

Raghuram TC, Sharma RD, Sivakumar B and Sahay BK, 1994. Effect of fenugreek seeds on intravenous glucose disposition in non-insulin dependent diabetic patients. Phytotherapy Research, 8, 83–86.

Sharma RD, 1986. Effect of fenugreek seeds and leaves on blood glucose and serum insulin responses in human subjects. Nutrition Research, 6, 1353–1364.

Sharma RD and Raghuram TC, 1990. Hypoglycaemic effect of fenugreek seeds in non-insulin dependent diabetic subjects. Nutrition Research, 10, 731–739.

Sharma RD, Sarkar A, Hazra DK, Mishra B, Singh JB, Sharma SK, Maheshwari BB and Maheshwari PK, 1996a. Use of fenugreek seed powder in the management of noninsulin dependent diabetes mellitus. Nutrition Research, 16, 1331–1339.

Sharma RD, Sarkar A, Hazra DK, Misra B, Singh JB and Maheshwari BB, 1996b. Toxicological evaluation of fenugreek seeds: a long term feeding experiment in diabetic patients. Phytotherapy Research, 10, 519–520.

Venn BJ and Green TJ, 2007. Glycemic index and glycemic load: measurement issues and their effect on diet-disease relationships. European Journal of Clinical Nutrition, 61 (Suppl. 1), S122–131.