Study on Nutrient Content Loss of Processing Manual Vegetable Noodles by Different Cooking Methods

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Abstract. The scientific and reasonable heat treatment methods can be determined after processing through different heat treatment on manual vegetable noodles, using some apparatus like the Kjeldahl nitrogen, Soxhlet extraction and spectrophotometry methods to analyze protein, fat, vitamins and observe their nutritional composition changes. The results showed that: after different heat treatments on manual vegetable noodles, all kinds of nutrient content have some changes of certain differences. Among the changes, vitamin B2 and vitamin C contents produce more apparent changes, and vitamin C loss is more severe. With the prolongation of heating time, vitamin C loss increases; fat content has little growth; adding proper amount of white vinegar into the heating medium, the loss of vitamin B2 and vitamin C reduces; after adding proper amount of dietary alkali, the loss of vitamin B2 increase obviously.

1. Introduction
Noodles are a traditional family food in China. With the establishment of people's scientific diet and healthy dietary ideas, diversified, natural, convenient, nutritious, green and other delicacies fill the family diet [1]. In recent years, many new vegetable noodle products have emerged at home and abroad, such as buckwheat health noodles, egg noodles, pumpkin noodles, etc. [2]. This study manual spinach noodles, celery manual noodles, broccoli manual surface as the object, adopts the kjeldahl nitrogen determination apparatus, instruments and soxhlet extraction methods such as spectrophotometric method after different heat treatment process of spinach manual surface in the change of nutrients such as protein, fat, vitamin, science selects the aging heat treatment way for the people provides the related parameters, guiding people scientific diet.

2. Materials and methods

2.1. Experimental materials

2.1.1. Experimental materials. "Xiangbao" high-grade snowflake wheat flour; "Luhua" peanut vegetable oil; Fresh spinach; Fresh celery; Fresh broccoli; The above raw materials are purchased from fengyang trust-mart.

2.1.2. Experimental reagent. Anhydrous ether (without peroxide), filter tube, potassium hypochlorate and potassium permanganate, hydrogen peroxide, anhydrous ethanol, quartz sand, calcium carbonate
powder, oxalic acid, ascorbic acid; 36% hydrochloric acid; 2, 6-dichloroindophenol sodium salt (Alfa Aesar); Distilled water, etc.

2.2 equipment and instruments
Soxhlet extractor; Dryer; MT25 electric dough press; Electronic analytical balance AL204 (mettler Toledo instruments (Shanghai) co., LTD.); Electric thermostatic air blast drying box 101C - 3B (Shanghai instrument group manufacturing sanpi jiamin instrument co., LTD.); Digital display constant temperature water bath box ( jintan city jincheng guosheng experimental instrument factory); (Shanghai xinjia electronics co., LTD.); Digester kdn-04 (Shanghai xinjia electronics co., LTD.); Rj-idl-50a, low-speed, table-top and large-capacity centrifuge; Juicer, measuring tube, induction cooker, etc.

2.3 technological process of vegetable handmade noodles
Vegetable Raw Material—— Select—— Clean—— Protect Green—— Chop— — High Speed Mashed—— Vegetable Puree—— Filter—— Filter Juice—— Mix Noodles— — Press Noodles—— Cut Strips—— Boil——0 Finished Products[3]

2.4 operating process
(1) Protect the green of vegetables [4] : blanch the vegetables at 100℃ for 2min, and take them out for later use. The goal is to remove oxalic acid and protect the color
(2) dough mixing: after weighing the raw materials and auxiliary materials in a given proportion (40g vegetables, 44ml water and 200g flour), put them into a mixing bowl and mix them fully to form a loose granular dough, knead them into a smooth surface and leave them for 12 to 18 minutes.
(3) Surface pressing: good dough can be formed into a smooth and smooth surface with fine organization, adhesion, even thickness and thickness through roller pressing, and a surface belt that meets the requirements can be formed after multiple roller pressing.
(4) Strips: hand-cut noodles about 2cm wide.

2.5 protein determination
The protein content was determined by GB6432-86 kjeldahl method. The cooked vegetable handmade noodle samples were put into a glass container and dried in a drying oven at 65℃ for 4 hours. After cooling, the samples were put into a dry grinding bowl and ground for use. Sample treatment for fat measurement: put the cooked vegetable handmade noodle samples into a glass container and dry them in a drying box at 65℃ for 4 hours. Then take them out and cool them in a dry grinding bowl and grind them for use. Test the sample treatment of vitamin C: the processed vegetable hand-made noodle sample will be dried, ground and determined directly [5].

2.6 determination of fat
The content of fat was determined by GB6433-86 soxhlet extraction. Accurately weigh and take 2-5g (accurate to 0.01mg) of even sample vegetable dough slices and put them into the filter tube. Put the filter paper cylinder into the extraction cylinder of soxhlet extractor, connect the fat flask that has been dried to constant weight, add ethyl ether or petroleum ether to the upper end of the condensing tube of the extractor to 2/3 of the volume of bottle contents, pass in condensed water, immerse the bottom bottle in the water bath for heating, and gently insert a small group of absorbent cotton into the upper mouth of the condensing tube. Based on the fact that fat can be dissolved in organic solvent, the sample was repeatedly extracted with anhydrous ether or petroleum ether in soxhlet extractor. After extracting the fat in the sample, the solvent was evaporated. The obtained substance was called fat or crude fat [6].

2.7 determination of vitamin C
Accurately weigh about 0.2g samples in the iodine measuring bottle, add 50ml newly boiled and cooled distilled water and 5ml glacial acetic acid to dissolve. Accurately remove 50.00mL of iodine standard solution into the iodine measuring bottle and shake well. The remaining iodine was titrated with
Na₂S₂O₃ standard solution and titrated until the solution was pale yellow. Then 2ml 0.5% starch solution was added and titrated until the blue color just disappeared. The volume of titration consumption recorded is V. According to the volume consumed by titration, it is calculated according to formula (1) [7].

$$V_{c}\% = \left[ \frac{(C_1 / 2I_2 \times 50.00 - CNa₂S₂O₃V) \times 88.06 / 1000 \times 100}{m} \right]$$

2.8. determination of vitamin B₂
Samples dried to constant weight were diluted with 0.01mol.L⁻¹ sodium hydroxide solution and made into a solution of 100. As the storage solution, the storage solution was absorbed into 2.0, 3.0, 4.0, 5.0, 6.0 and 7.0ml. In terms of concentration (C) and absorption degree (A), the regression equation is obtained: A=0.010248+0.031067C (r=0.9999, n=6). [8]

3. Results and analysis

3.1. precooking temperature and time selection basis
The precooking temperature and time can not only soften the tissue and facilitate the dough operation, but also passivate the oxidase to protect the color of vegetables [8]. The color change of green vegetables can be controlled by proper precooking temperature, as shown in table 1.

| time  | 80°C | 85°C | 90°C      | 95°C       |
|-------|------|------|-----------|------------|
| 1min  | Enzyme is not passivated, easy to change color | Enzyme mildly passivated, long time easy to discoloration | Enzyme inactivation, certain color protection effect | Enzyme inactivation, good color protection effect |
| 2~3min| The enzyme was slightly inactivated and discolor for a long time | Partial passivation, certain color protection effect | Enzyme inactivation is better for color protection | The enzyme is all passivated, the color protection effect is good |
| 5min  | Some of the enzymes were inactivated and discolored over time | Overcooked and yellow | overripe | undone |

As can be seen from table 1, when the vegetable was blanched and color-protected in the early stage, the color-protected effect was more obvious with the increase of temperature. When cooked for more than five minutes, vegetables become overcooked. When the boiling time is 2~3min, the color protection effect is relatively good at the same temperature, and the color protection effect is best at about 95°C.

3.2. effects of different heat treatment temperatures on nutrients in vegetable handmade noodles
On the condition that the heating time is 2min and no other medium is added to the boiling water, the handmade noodles of spinach, celery and broccoli are respectively processed by boiling at 80°C, 90°C and 100°C, and the changes of protein, fat, vitamin and other nutrients in the noodles are observed respectively. The results are shown in figure 1, figure 2 and figure 3.
It can be seen from figure 1, 2 and 3 that, compared with the control group, several different temperature Settings all led to the loss of three nutrients. Among them, temperature had the greatest impact on vitamin C, with the loss reaching about 40%. The effect on fat and protein was small, with little change in fat loss. After cooking at different temperatures, the vegetable noodles are all ripe, and there is no great difference in color and taste. To sum up, when cooking vegetable noodles at 80℃, it has gorgeous colors and good taste, while maintaining a low nutrient loss, with the best overall effect.

3.3. effects of different heat treatment time on nutrients in vegetable handmade noodles
Under the condition that the boiling temperature is 100℃ and the boiling water quality does not add other media, the vegetable handmade noodles are respectively cooked for 1min, 2min and 3min. The changes of protein, fat, vitamin and other nutrients are shown in figure 4, figure 5 and figure 6.
It can be seen from figure 4, 5 and 6 that: different heating times lead to the loss of three nutrients, protein changes are not obvious, and fat loss is hardly different. The initial change of vitamin C after heating was obvious, and then it was basically stable. The change of vitamin B2 with temperature rise is more obvious, the loss is relatively obvious. Among them, when the cooking time is 1min, the vegetable handmade noodles are not fully mature. When it is around 2min, the vegetable handmade noodles are fully mature with bright colors. Therefore, when the cooking time is less than 2 minutes, the vegetable handmade noodles can maintain good taste and color with relatively low loss of nutrients, and the overall effect is the best.

3.4. effects of different heat treatment media (ph, electrolyte, etc.) on nutrients in vegetable handmade noodles

Under the condition that the heating temperature was 100℃ and the heating time was 2min, the cooked vegetable handmade noodles were added with salt 2g, edible vinegar 2ml, edible alkali 2g, edible oil 4ml(boiled water volume was 1L) and other media, respectively. The changes of protein, fat, vitamin and other nutrients in the noodles were shown in figure 7, figure 8 and figure 9.
It can be seen from figure 7, 8 and 9 that when different media are added to ripeness vegetable handmade noodles, there is little influence on protein and fat, and there is no great change in nutrient loss. However, it has a great influence on vitamin C and vitamin B2. When the water becomes acidic, both of them reduce the loss. When the water becomes alkaline, the dissolution of both is promoted and the loss of nutrients in the dough slice is increased. When cooking oil and edible salt were added to the cooking water, the taste of the nutrients changed slightly. Cooking vegetable noodles with edible salt had a slightly salty taste, while cooking vegetable noodles with edible oil had a relatively bright color. To sum up: when cooking vegetable noodles, add edible vinegar, can reduce the loss of vitamin C, vitamin B2, so that spinach noodles to maintain more nutrients.

4. Conclusion
The results showed that the contents of various nutrients in vegetable handmade noodles changed after different heat treatment methods, among which the contents of vitamin B2 and vitamin C changed significantly, and the loss of vitamin C was serious. With the extension of heating time, the loss also increased. Fat content had little effect; after adding white vinegar into the heating medium, the loss of vitamin C and vitamin B2 was obviously reduced. The loss of vitamin C and B2 was increased by adding...
edible alkali into the heating medium. So, when cooking vegetable manual face, add proper amount to eat vinegar, can reduce the loss of partial vitamin, increase human body to need nutrient relatively, unfavorable in cooking vegetable face add edible alkali.

5. Reference

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