



QUALITY EVALUATION OF HOAI SON TUBERS (*DIOSCOREA PERSIMILIS* HOOK.F.) CULTIVATED IN NHO QUAN, NINH BINH

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ABSTRACT

Background: *Dioscorea tubers* have been planned in Van Phuong, Nho Quan (Ninh Binh) since 2020. Evaluating the quality of domestically produced medicinal herbs, preserving the genes of indigenous medicinal plants, and thereby proactively sourcing internal medicinal herbs is an urgent requirement. **Objectives:** Evaluate the quality of tubers collected from *Dioscorea persimilis* Hook.f. trees, *Dioscoreaceae* family, which grown in Nho Quan district, Ninh Binh province in 2023 according to the criteria specified: described in morphology, microsurgical characteristics, and powder examination; Determine moisture. **Material and Methods:** Tubers harvested from 1-year-old Hoai Son trees were described in morphology, microsurgical characteristics, and powder examination; Determine moisture. **Results:** The quality of Hoai Son tubers meets the regulations of PV EV on the following indicators: Description of medicinal herbs, microsurgical characteristics, powder screening; humidity: 12.03%. **Conclusion:** Hoai Son medicinal herbs grown in Nho Quan, Ninh Binh meet the criteria specified in PV EV.

Keywords: *Dioscorea tubers*, quality medicinal herbs, Ninh Binh.

1. Introduction

Chinese yam (*Dioscorea tubers*) has long been used in Vietnam as both medicine and food, and it is included in the national pharmacopeia (Ministry of Health, 2017). The medicinal material derived from Chinese yam has hypoglycemic, anti-infective, digestive-stimulating effects and is used for treating skin abscesses (Nguyen Viet Than, 2020). Currently, most Chinese yam used in Vietnam is still imported; only a small amount is collected from the wild or cultivated in certain localities. Among these, Chinese yam has been experimentally cultivated in Van Phuong, Nho Quan (Ninh Binh) since 2020 and has been supplied

to customers as food, but its quality for medicinal use has not yet been evaluated. Research results on Chinese yam serve as the basis for confirming its quality and further expanding its cultivation and harvesting for medicinal purposes.

2. Materials and Methods

2.1. Experimental materials

Chinese yam roots cultivated for 12 months were harvested, washed, and dried at 60°C until completely dry.

Solvents and chemicals meeting analytical grade standards.

Laboratory equipment meeting experimental standards.

2.2. Experimental methods

Each experiment was arranged in a completely randomized design with 5 replications. Data were processed using Microsoft Excel.

All experiments were conducted according to the pharmacopeial monograph (Ministry of Health, 2017).

2.3. Observed indicators and analytical methods

Macroscopic characteristics: The swollen tuberous root appears in various shapes, typically cylindrical, straight or curved, from 5 cm in length upward, and may reach up to 1 m; diameter ranges from 1-3 cm and can reach 10 cm. The exterior is yellow-brown, smooth, firm; the fracture surface contains abundant ivory-white powder with no fibers. When sliced thinly, the outer surface is white or pale yellow, the texture is brittle and easily broken; the

fracture surface is white with abundant starch (Ministry of Health, 2017).

Powder microscopy: Starch grains are ovoid or bell-shaped, 10-60 μm long and about 15-50 μm wide, showing concentric striations with an eccentric hilum appearing as a dot or fissure. Calcium oxalate crystals are needle-shaped, 35-50 μm long. Parenchyma fragments have thin-walled cells containing starch. Reticulate vessels are present (Ministry of Health, 2017).

Qualitative identification: Under ultraviolet light, Chinese yam powder exhibits bright white fluorescence (Ministry of Health, 2017).

Moisture content: The moisture content of Chinese yam must not exceed 14% (Ministry of Health, 2017).

3. Results and Discussion

3.1. Characteristics of *Dioscorea persimilis* (Figure 1)



Figure 1. Fresh Chinese yam (1a) and sliced, dried Chinese yam (right)

The external morphology of Chinese yam exhibits characteristics consistent with the description in the pharmacopeia (Ministry of Health, 2017). Notably, the tubers display branching and a heavier mass, which helps distinguish them from

Dioscorea cirrhosa (“Coc”), a non-branching species that is often mistaken for Chinese yam (Nguyen Viet Than, 2020).

3.2. Microscopic characteristics of Chinese yam powder (Figure 2)

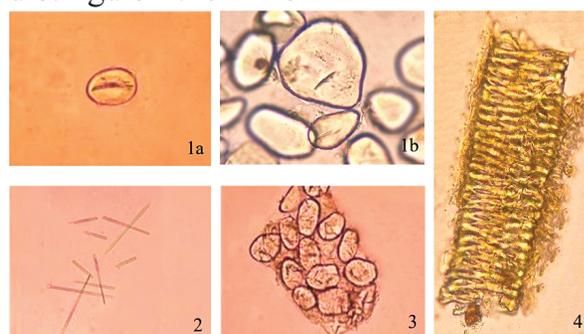


Figure 2. Microscopic features of Chinese yam powder

Legend: 1a: Ovoid or bell-shaped starch granules (1b); 2: Needle-shaped calcium oxalate crystals; 3: Parenchyma fragments with thin-walled cells containing starch; 4: Reticulate vessels.

The components observed in the sample match the requirements of the pharmacopeia (Ministry of Health, 2017), the herbal medicine teaching materials (Hanoi University of Pharmacy, 2001), and previous publications (Nguyen Thi Thu Huyen et al., 2019). The sample examined consists of starch from Chinese yam.

3.3. Qualitative identification

+ Under ultraviolet light, the powdered material emits bright white fluorescence (Figure 3):

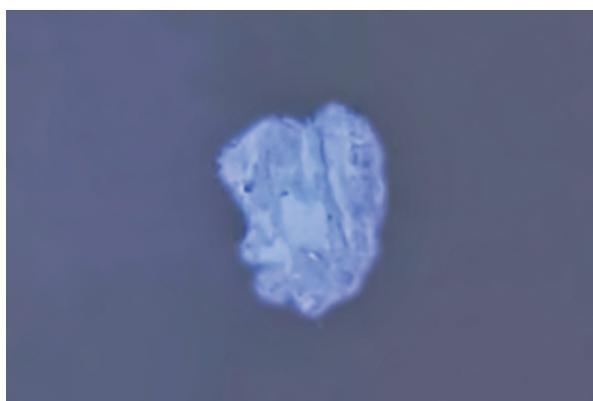


Figure 3. Chinese yam powder under UV light at $\lambda = 366 \text{ nm}$

The starch in Chinese yam exhibits fluorescence, and the sample tested shows characteristics consistent with textbook descriptions (Hanoi University of Pharmacy, 2001) and published research (Nguyen Thi Thu Huyen et al., 2019).

+ Thin-layer chromatography (TLC) (Figure 4).

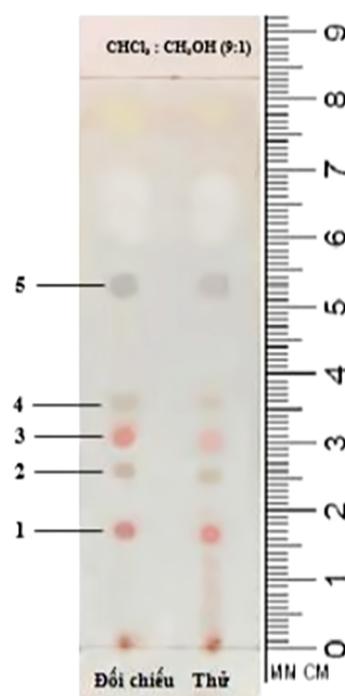


Figure 4. TLC results of Danapha Chinese yam powder (reference sample) and test sample (research sample)

TLC spot	Color	Rf
1	Pink	0.16
2	Dark gray	0.31
3	Light pink	0.37
4	Ash gray	0.43
5	Gray	0.64

On the chromatograms, both the reference sample and the test sample displayed 5 spots with colors and Rf values comparable to the standard herbal material (Danapha

Pharmaceutical JSC, 2021), consistent with the pharmacopeial requirements (Ministry of Health, 2017) and teaching materials (Hanoi University of Pharmacy, 2001).

3.4. Moisture content

Table 2. Moisture content of Chinese yam

Sample	Sample weight (g)	Moisture (%)	Pharmacopoeia limit (Vietnamese Pharmacopoeia V)	Conclusion
1	1.0012	12.05	≤ 14%	Pass
2	1.0006	12.09		
3	1.0007	11.94		
X ± SD		12,03 ± 0,06		
RSD (%)		0,03		

The average moisture content of the Chinese yam samples was $12.03 \pm 0.06\%$, below the permissible limit (not more than 14%) (Ministry of Health, 2017), and not significantly different from the comparison sample (12.04%) (Danapha Pharmaceutical JSC, 2021). The moisture content of the Chinese yam meets current medicinal material requirements (Ministry of Health, 2025).

4. Conclusion

The Hoai Son tuber grown and harvested in Nho Quan, Ninh Binh meets the criteria for medicinal plant characteristics, herbal powder analysis, qualitative determination, and moisture content as per the regulations of ĐĐVN V.

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EARLY OUTCOMES OF SURGICAL MANAGEMENT OF CLOSED CLAVICLE FRACTURES AT VO TRUONG TOAN UNIVERSITY HOSPITAL

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ABSTRACT

Background: Clavicle fractures account for 5% of all fractures and clavicle internal fixation surgery is commonly used. Through clinical practice in Hau Giang province, we found that the above technique has many advantages over other techniques, so we carried out this topic. Objectives: 1. Research on clinical and paraclinical characteristics of clavicle fracture patients undergoing bone internal fixation surgery at Vo Truong Toan University Hospital. 2. Research on early results of bone internal fixation surgery to treat closed clavicle fractures at Vo Truong Toan University Hospital. Materials and methods: Retrospective study of 33 patients with closed clavicle fractures operated on at Vo Truong Toan University Hospital from January 2016 to January 2022. Results: The study included 82% men, 12% women, with the 20-39 age group accounting for the largest number. Signs of deformation account for 100%, signs of abnormal movement account for 12%. Signs of swelling accounted for 52%, bruising accounted for 30%, sharp pain accounted for 34.6%, and 46% of patients had limited movement. Middle third fractures account for 88%, short overlap fractures account for 85%, diagonal fractures account for 45.5%. 100% have not recorded complications after surgery, 100% of post-operative X-ray images are not displaced. Conclusion: Treating patients with clavicle fractures with surgery gives good results and can be widely applied.

Keywords: Clavicle fracture, surgery, X-ray.

1. Introduction

Clavicle fracture is a common injury, accounting for 5% of all fractures and 44% of fractures in the shoulder girdle, with an increasing trend due to traffic accidents and occupational injuries [6]. Surgical treatment of clavicle fractures has fundamentally overcome the limitations of conservative treatment. These advantages include: applicability to various types of fractures, including complex clavicle fractures; the ability to anatomically and physiologically

realign the fractured bone; stable fixation that minimizes displacement and reduces harmful complications; and, during the treatment period, patients do not need to frequently use external fixation devices, which allows them greater comfort in daily activities. Patients can also begin early mobilization and participate in light work [2].

At Vo Truong Toan University Hospital, the technique of internal fixation for clavicle fractures has been applied for a long time. However, there has been no

research evaluating the effectiveness of this treatment method. Therefore, we conducted the specialized study titled “Study on Early Results of Surgical Treatment of Closed Clavicle Fractures at Vo Truong Toan University Hospital” with two objectives:

- To investigate the clinical and paraclinical characteristics of patients with clavicle fractures undergoing internal fixation surgery at Vo Truong Toan University Hospital.
- To study the early results of internal fixation surgery in treating closed clavicle fractures at Vo Truong Toan University Hospital.

2. Subjects and Research Methods

2.1. Study Subjects

Patients diagnosed with closed clavicle fractures who underwent surgery at Vo Truong Toan University Hospital from January 2016 to January 2022 were included in the study. The inclusion criteria consisted of patients aged 16 years or older with closed clavicle fractures, who were indicated for surgery during this period and agreed to participate. Patients with incomplete medical records were excluded from the study.

2.2. Research Methods

This study employed a cross-sectional, retrospective, descriptive design. A total of 33 patients were included using a convenience sampling method. Data were collected from all patients who met the inclusion criteria throughout the study period.

The study variables included general characteristics such as age and gender; clinical and radiological characteristics such as definite and suspected signs of fracture, fracture location, type of displacement, and fracture pattern. Postoperative outcomes were assessed through anteroposterior and lateral clavicle X-rays and evaluation of early complications, including surgical site infection, subclavian vessel injury, and brachial plexus injury.

Information was obtained from the medical records of patients aged 16 years or older who were diagnosed with closed clavicle fractures and underwent surgery at Vo Truong Toan University Hospital between January 2016 and January 2022. Data were processed and analyzed using SPSS version 26. Qualitative variables were presented as percentages, while quantitative variables were expressed as mean values.

3. Research Results

3.1. General Characteristics

The 20-39-year-old age group accounted for the highest proportion at 58%, followed by the 40-59 age group at 24%, the ≥ 60 age group at 12%, and the <20 age group at 6%.

The proportion of clavicle fractures in males was higher than in females, with a male-to-female ratio of 4.55:1 (82% male, 18% female).

3.2. Clinical and Radiological Characteristics

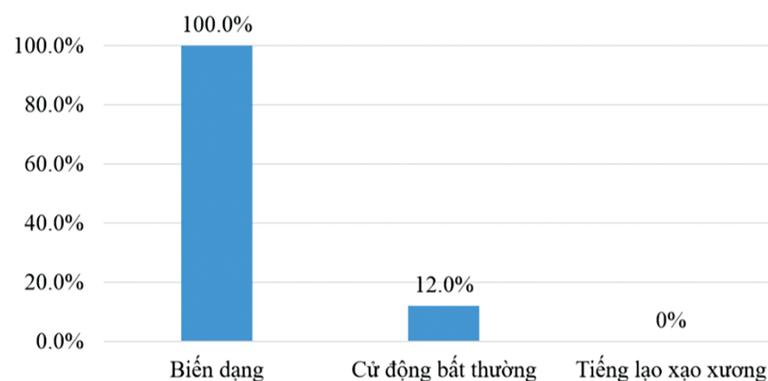


Chart 1. Definite signs of clavicle fracture

Observation: Among definite fracture signs, deformity was the most common, present in 100% of the 33 cases, while

abnormal movement was observed in 12%. No crepitus was recorded.

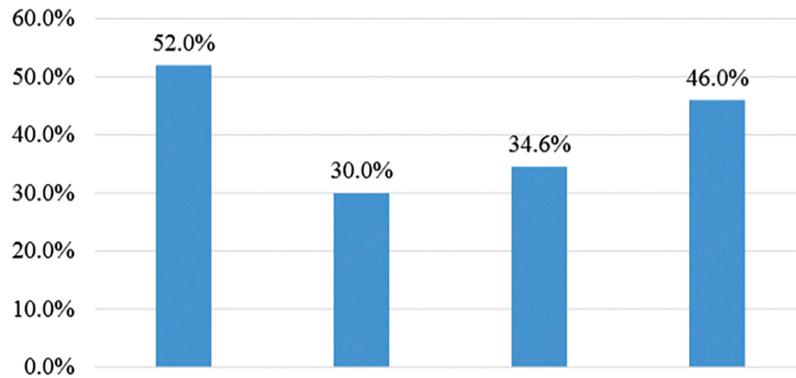


Chart 2. Suspected signs of clavicle fracture

Observation: Swelling (52%) was the most frequent sign, while bruising was the least common at 30%. Sharp pain was

reported in 34.6% of patients, and 46% had limited mobility.

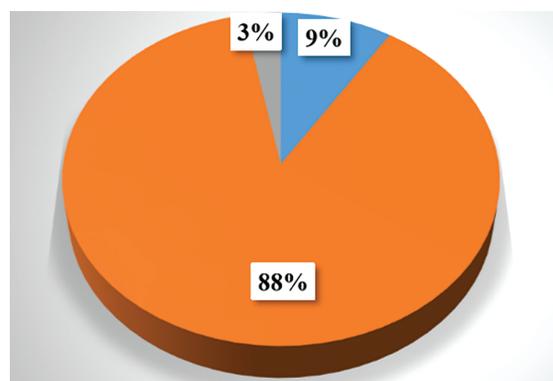


Chart 3. Fracture location distribution

Observation: Middle-third fractures accounted for the highest proportion at 88%,

followed by lateral-third fractures at 9%, and medial-third fractures at 3%.

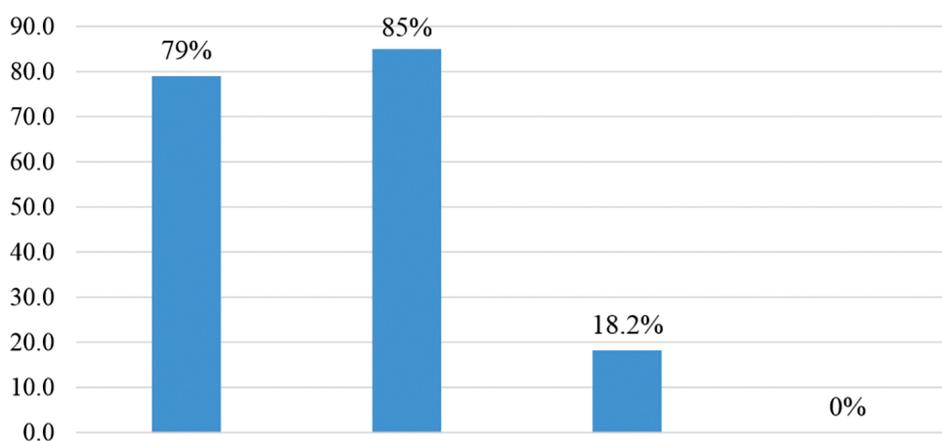


Chart 4. Displacement distribution in closed clavicle fractures

Observation: Short overlap axial displacement was the most frequent at 85%, lateral displacement at 79%, and angulated displacement at 18.2%. No cases of rotational displacement were recorded. Fracture patterns: Oblique fractures were most

common at 45.5%, followed by comminuted fractures at 30.3% and transverse fractures at 24.2%. No spiral or crushed fractures were observed in this study.

3.3. Postoperative Outcome Assessment

Table 1. Postoperative X-ray results

X-ray result	n	%
No displacement	33	100%
Minimal displacement	0	0%
Significant displacement	0	0%
Total	33	100%

Observation: Overall, postoperative X-rays of 33 patients with closed clavicle

fractures at Vo Truong Toan University Hospital showed 100% with no displacement.

Table 2. Early complications

Early complication	n	%
Surgical site infection	0	0%
Subclavian vessel injury	0	0%
Brachial plexus injury	0	0%
No complications observed	33	100%
Total	33	100%

Observation: Based on the statistical evaluation of treatment outcomes, 100% of patients did not experience any early complications.

activities and frequently use motorcycles, thus being at higher risk for clavicle fractures. These findings are consistent with our results.

4. Discussion

4.1. General Characteristics

Our study found that the age group with the highest incidence of closed clavicle fractures was 20-39 years, accounting for 58%, while the <20 age group was the least affected at 6%. According to Nguyen Quoc Thai (2017), the annual incidence of clavicle fractures in the 20-39 age group ranges from 17.9% to 20.5% [6], and Pham Ngoc An (2014) reported that closed clavicle fractures most commonly occur in individuals aged 20-35 years, accounting for 32.2% [1]. Most studies indicate that the most frequently affected age groups are working-age adults and students who actively participate in social

We observed a higher incidence of closed clavicle fractures in males than in females, at 82% and 18%, respectively. Similarly, Nguyen Quang Hoe et al. (2015) reported that 76.16% of clavicle fractures occurred in males, which is higher than in females [3]. This may be explained by males being the main workforce and more frequently consuming alcohol while operating vehicles.

4.2. Clinical and Radiological Characteristics

In our study, clavicular deformity was observed in 100% of cases, making it one of the most reliable signs for diagnosing fractures. Abnormal movement was observed in 12% of cases. Crepitus, caused by bone fragments rubbing against each other during

movement or palpation, is also considered a definite sign of clavicle fracture.

Swelling was the most common sign, present in 52% of patients, while bruising was least common at 30%. Sharp pain was noted in 34.6%, and 46% of patients had swelling at the fracture site. These findings are consistent with the typical clinical features of closed clavicle fractures described in the literature.

According to Nguyen Quang Hoe et al. (2015), middle-third clavicle fractures accounted for the highest proportion at 69.49%, lateral-third fractures 27.2%, and medial-third fractures only 3.39% [3]. These results are similar to ours, indicating that closed clavicle fractures most frequently occur in the middle third. This aligns with the anatomical characteristics of the clavicle, which is horizontally positioned above and anterior to the chest, extending from the sternum to the acromion. The medial two-thirds of the clavicle curve posteriorly, while the lateral third curves anteriorly, forming an S-shape. Therefore, the middle and lateral thirds are biomechanically weaker and more prone to fracture.

In our study, short overlap axial displacement was the most common at 85%, and lateral displacement was 79%, which corresponds to the fracture mechanism described above. Angular and rotational displacements, which are atypical and usually occur due to direct trauma, were less frequent, with angular displacement observed in 18.2%. These results differ from Nguyen Van Phuoc (2015), where most cases were angular displacements (52.6%), followed by lateral displacement (28.9%), short overlap (10.6%), and longitudinal displacement (7.9%) [4]. This discrepancy may be due to differences in study population and timing.

Regarding fracture patterns, transverse fractures were the least frequent at 24%,

fractures with separate fragments accounted for 30%, and oblique fractures were the most common at 46%. Our findings differ significantly from the study by Nguyen Huu Quyen at Dan Phuong General Hospital, where complex fractures with separate fragments predominated at 77.2% [5].

4.3. Postoperative Outcome Assessment

X-ray imaging is an essential diagnostic tool for confirming fractures and determining fracture types (simple: transverse, oblique, spiral; complex: multi-level, comminuted; intra-articular), assessing displacement (four common types: short overlap, lateral, angular, rotational), planning treatment, and identifying associated dislocations or post-fixation displacement [8]. In our study, 100% of patients showed no postoperative displacement. Most patients received timely surgery with appropriate fixation methods, resulting in high treatment efficacy.

Regarding complications, among the 33 patients who underwent surgical treatment for closed clavicle fractures at Vo Truong Toan University Hospital, no early complications were recorded, including infection, malunion, brachial plexus injury, or subclavian vessel injury. In comparison, Simone Wolf et al. (UK) reported a 3.5% incidence of surgical site infection in 672 patients [7], and Neer C. reported a 13% incidence of brachial plexus injury in 62 patients [9]. The absence of complications in our study may be attributed to differences in treatment methods, patient compliance across regions, and, importantly, the small sample size. Therefore, some complications may not have been observed in our study.

5. Conclusion

The surgical method for clavicle fractures provides stable fixation, and postoperative patients rarely experience complications. This technique should be widely applied.

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