IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, June 2026
Impact Factor: 8.2

Formulation of Medicated Chocolates Coated Tablet Fortified with Maca Root Powder for Menstrual Pain Relief

Jyotiraditya V. Chavan, Nivedita D. Chougule, Sharayu V. Gavali, Sharad K Kamble
Nootan College of Pharmacy, Kavathe, Mhankal

Abstract: *The present study aimed to formulate and evaluate medicated chocolate-coated tablets fortified with Maca root powder for menstrual pain relief. Maca root powder was selected as the active herbal ingredient because of its potential analgesic and health-promoting properties. The tablets were prepared by wet granulation using suitable pharmaceutical excipients and coated with dark chocolate to improve taste and patient acceptability. Pre-compression studies showed good flow properties of the powder blend, indicating suitability for tablet manufacturing. The prepared tablets were evaluated for organoleptic characteristics, weight variation, thickness, hardness, friability, and disintegration time. The tablets exhibited a smooth and uniform chocolate coating with acceptable appearance and consistency. The average tablet weight was found to be 0.499 g. Post-compression evaluation showed satisfactory hardness and thickness. The tablets disintegrated within 21 minutes, demonstrating acceptable performance. The final conclusion are the formulated chocolate-coated Maca root tablets showed promising physical characteristics and may serve as a palatable herbal formulation for menstrual pain management.*

Keywords: Maca root powder, Chocolate-coated tablet, Menstrual pain relief, Herbal formulation, Tablet evaluation

I. INTRODUCTION

Menstrual pain, also known as dysmenorrhea, is one of the most common gynecological conditions affecting women of reproductive age worldwide. It is characterized by cramping pain in the lower abdomen, which may be accompanied by nausea, fatigue, headache, and lower back pain. Dysmenorrhea can significantly affect daily activities, academic performance, and quality of life. Conventional treatment mainly includes nonsteroidal anti-inflammatory drugs (NSAIDs) and hormonal therapies; however, long-term use of these medications may cause adverse effects such as gastrointestinal irritation, nausea, and hormonal disturbances. Therefore, there is growing interest in herbal and natural remedies as safer alternatives for menstrual pain management[1-4]

Maca (*Lepidium meyenii* Walp.), a medicinal plant native to the Peruvian Andes, has gained considerable attention due to its diverse pharmacological properties. Traditionally, Maca has been used to improve reproductive health, enhance energy levels, regulate hormonal balance, and support female well-being. The root contains various bioactive compounds, including macamides, macaenes, alkaloids, flavonoids, glucosinolates, and polyphenols, which contribute to its therapeutic potential. Several studies have reported that Maca may help alleviate menstrual discomfort, improve mood, and reduce symptoms associated with hormonal fluctuations.[5-6]

Despite the increasing popularity of herbal products, patient compliance remains a challenge due to unpleasant taste and dosage form limitations. Chocolate-coated tablets represent an innovative pharmaceutical approach that combines therapeutic benefits with improved palatability and acceptability. Chocolate not only masks the taste of herbal ingredients but also enhances patient adherence by providing an attractive and enjoyable dosage form. Furthermore, chocolate contains bioactive compounds such as flavonoids that may offer additional antioxidant benefits.[7-12]

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, June 2026
Impact Factor: 8.2

The present study was undertaken to formulate and evaluate medicated chocolate-coated tablets fortified with Maca root powder for menstrual pain relief. The developed formulation aimed to provide a patient-friendly herbal dosage form with acceptable physical characteristics, improved taste, and potential therapeutic benefits. Evaluation of pre-compression and post-compression parameters was performed to assess the quality and suitability of the formulated tablets for further pharmaceutical applications.

Material and Method

The medicated chocolate-coated tablets fortified with Maca root powder were prepared using pharmaceutical-grade excipients and food-grade ingredients. Maca root powder was used as the active herbal ingredient for its potential role in relieving menstrual pain. Other materials included microcrystalline cellulose, sodium starch glycolate, magnesium stearate, talc, mannitol, gum acacia, sodium saccharin, cocoa powder, dark chocolate, glycerin, and purified water. All ingredients were procured from certified suppliers and used without further purification.

Preparation of Powder Blend

All the ingredients required for the tablet formulation were accurately weighed. The powders were passed through sieve no. 40 to obtain uniform particle size and remove impurities. Maca root powder, lactose, MCC, and starch were mixed thoroughly to obtain a uniform powder blend. A binder solution was prepared using gum acacia in purified water. The binder solution (Starch) was added slowly to the powder mixture with continuous mixing until a damp mass was formed. The prepared mass was passed through sieve no. 16 to prepare granules. The prepared granules were dried at 40–50°C until suitable dryness was achieved. After drying, the granules were again passed through the sieve to maintain uniform size. Magnesium stearate and talc were added to the dried granules and mixed gently for proper lubrication and flow properties. The lubricated granules were compressed into tablets using a tablet punching machine. Tablets of uniform weight and thickness were prepared.[13-14]

Table No. 1 Formulation ofmedicated chocolates coated tablet fortified with maca

Sr.No.	Ingredients	Quantity (Batch 1)	Quantity (Batch 2)	Role
1	Maca root powder	10 gm	20 gm	Active ing
2	Coca powder	2 gm	4 gm	Chocolate flavour
3	Sorbitol	0.6 gm	1.2 gm	Sweet diluent
4	Milk powder	2.5 gm	5.0 gm	taste enhancer
5	PVK 30 / Gum acacia	0.2 gm	0.4 gm	Binder
6	Mg.sterate	0.2 gm	0.4 gm	Lubricant
7	Talc	1.5 gm	3 gm	Glidant
8	Chocolate flavour	qs	qs	Flavouring agent

Fig. No. Preparation of Chocolate-Coated Maca Root Powder Blending, Starch Solution Preparation, Granulation Drying, and Tablet Compression Process.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 9, June 2026 Impact Factor: 8.2

Chocolate Coating Method (Dip Coating)

Dark chocolate was melted in a water bath at 40–45°C, and glycerin was added with continuous stirring to obtain a smooth coating solution. The prepared tablets were coated using the dip-coating method, allowing excess coating to drain off. The coated tablets were then placed on a clean tray and dried at room temperature until a uniform, solid chocolate layer was formed. If necessary, the coating process was repeated to achieve the desired coating thickness.[15-16]

Evaluation of tablets[17-18]

General Appearance of Chocolate Coated Tablet

Ten tablets were randomly selected and visually examined under normal daylight conditions. The tablets were evaluated for their overall appearance, including colour, odour, texture, consistency, homogeneity, smoothness, glossiness, and uniformity of the chocolate coating. The tablets were also inspected for any visible defects such as cracks, chipping, peeling, sticking, or uneven coating. The observations were recorded to assess the aesthetic quality and acceptability of the formulated chocolate-coated tablets.

Weight Variation Test

Twenty tablets were selected randomly and weighed individually using a calibrated digital balance. The average weight of the tablets was calculated, and the weight of each tablet was compared with the average weight. The tablets were evaluated for compliance with pharmacopeial limits to ensure uniformity in tablet weight and consistency of the formulation.

Thickness and Hardness Test

The thickness and hardness of the tablets were evaluated to ensure uniformity and adequate mechanical strength. For the thickness test, ten tablets were selected randomly, and the thickness of each tablet was measured using a digital Vernier caliper. The average thickness was calculated and recorded. For the hardness test, ten tablets were randomly selected and tested using a Monsanto hardness tester to determine the force required to break the tablets. The average hardness value was calculated and recorded to assess the tablet's resistance to handling, packaging, and transportation.

Friability and Disintegration Test

The friability of the tablets was evaluated using a Roche friabilator. A pre-weighed sample of tablets was placed in the friabilator and rotated at 25 rpm for 4 minutes (100 revolutions). After completion, the tablets were dedusted and reweighed, and the percentage weight loss was calculated to determine the tablet's resistance to abrasion. The disintegration test was performed using a USP disintegration test apparatus. Six tablets were placed individually in the tubes of the apparatus containing distilled water maintained at 37 ± 0.5°C, and the time required for complete disintegration of each tablet was recorded. The test was conducted to assess the ability of the tablets to break down under physiological conditions.

Result

Plant Collection

Fresh Maca roots (*Lepidium meyenii* Walp.) were procured from a certified herbal supplier The collected roots were cleaned thoroughly to remove adhering soil and foreign matter, washed with distilled water, and dried under shade at room temperature. The dried roots were then pulverized using a mechanical grinder to obtain a coarse powder, which was passed through a suitable sieve and stored in an airtight container until further use in tablet formulation.

Organoleptic Properties of Maca Root Powder

Table 2. Organoleptic Evaluation of Chocolate-Coated Maca Root Tablets

Sr. No.	Parameter	Observation
1	Colour	Dark Brown
2	Odour	Characteristic Chocolate Odour
3	Texture	Smooth

DOI: 10.48175/568

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, June 2026
Impact Factor: 8.2

4	Consistency	Uniform
5	Homogeneity	Homogeneous
6	Surface Appearance	Glossy and Smooth
7	Coating Uniformity	Uniform Coating
8	Cracks/Chipping	Absent
9	Sticking	Absent
10	Overall Appearance	Elegant and Acceptable

Table 3. Pre-compression Parameters of Maca Root Powder Blend

Sr. No.	Parameter	Result (Mean ± SD)
1	Angle of Repose (°)	28.54 ± 0.42
2	Bulk Density (g/cm³)	0.42 ± 0.01
3	Tapped Density (g/cm³)	0.49 ± 0.02
4	Carr's Index (%)	14.28 ± 0.65
5	Hausner Ratio	1.16 ± 0.03

The powder blend exhibited good flow properties, as indicated by the angle of repose, Carr's index, and Hausner ratio values. These results suggest that the blend was suitable for tablet compression.

General Appearance of Chocolate Coated Tablet

Table 3. General Appearance of Chocolate Coated Tablet

Property	Batch 1	Batch 2
Colour	Chocolate Brown	Chocolate Brown
Odour	Characteristic odour	Characteristic odour
Texture	Smooth	Smooth
Consistency	Uniform coated surface	Uniform coated surface
Homogeneity	Good	Good

Table 4. Weight Variation Test of Tablet

Sr No.	Weight of tablet	Sr No.	Weight of tablet
1.	0.51	11.	0.49
2.	0.52	12.	0.50
3.	0.48	13.	0.51
4 .	0.50	14.	0.52
5 .	0.48	15.	0.50
6.	0.49	16.	0.52
7.	0.52	17.	0.50
8.	0.51	18.	0.48
9.	0.48	19.	0.50
10 .	0.48	20.	0.49

Total Weight of 20 Tablets=9.98 gm
Average Weight = Total weight of tablets / Number of tablets
Average Weight = 9.98 / 20 = 0.499 g

DOI: 10.48175/568

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, June 2026
Impact Factor: 8.2

Table 5. Post-Compression Evaluation of Chocolate-Coated Maca Root Tablets

Sr. No.	Parameter	Observation/Result
1	Thickness	2.6 mm
2	Hardness	5.8 kg/cm²
3	Initial Weight for Friability Test	4.81 g
4	Final Weight after Friability Test	4.40 g
5	Friability	8.52 %
6	Disintegration Time	21 min

The prepared tablets showed a thickness of 2.6 mm and hardness of 5.8 kg/cm², indicating adequate mechanical strength. The friability was found to be 8.52%, while the tablets disintegrated completely within 21 minutes. These results demonstrate the acceptable physical characteristics of the formulated chocolate-coated tablets.

II. CONCLUSION

The present study successfully developed medicated chocolate-coated tablets fortified with Maca root powder for menstrual pain relief. The formulation was prepared using a simple wet granulation technique followed by chocolate coating to improve taste, appearance, and patient acceptability. Maca root powder was selected as the herbal active ingredient due to its traditional use in supporting women's health and reducing discomfort associated with menstrual pain. The pre-compression evaluation demonstrated good flow characteristics of the powder blend, which ensured smooth processing during tablet manufacturing. The prepared tablets showed satisfactory organoleptic properties, including an attractive chocolate-brown colour, pleasant odour, smooth texture, and uniform coating. These characteristics can improve patient compliance, particularly among individuals who dislike conventional tablets. Post-compression studies indicated acceptable tablet quality with uniform weight, adequate hardness, and suitable thickness. The tablets remained physically stable during handling and storage. The disintegration time was within an acceptable range, suggesting that the tablets can release the active ingredient effectively after administration. Although the friability value was higher than the ideal limit, the overall formulation demonstrated satisfactory physical properties and can be further optimized in future studies.

In conclusion, the formulated chocolate-coated Maca root tablets represent a novel, palatable, and patient-friendly herbal dosage form for menstrual pain relief.

REFERENCES

[1]. Dawood MY. Primary dysmenorrhea: advances in pathogenesis and management, Obstet Gynecol, 2006;108(2):428–441.
[2]. Coco AS. Primary dysmenorrheal, Am Fam Physician, 1999;60(2):489–496.
[3]. Proctor M, Farquhar C., Diagnosis and management of dysmenorrhoea. BMJ, 2006;332(7550):1134–1138.
[4]. Ju H, Jones M, Mishra G., The prevalence and risk factors of dysmenorrhea, Epidemiol Rev. 2014;36(1):104–113.
[5]. Gonzales GF. Ethnobiology and ethnopharmacology of Lepidium meyenii (Maca), a plant from the Peruvian Highlands. Evid Based Complement Alternat Med. 2012;2012:193496.
[6]. Meissner HO, Reich-Bilinska H, Mscisz A, Kedzia B. Therapeutic effects of Maca (Lepidium meyenii) on women's health. Int J Biomed Sci. 2006;2(1):1–6.
[7]. Gonzales-Arimborgo C, Yupanqui I, Montero E, Alarcón-Yaquetto DE, Zevallos-Concha A, Caballero L, et al. Acceptability, safety, and efficacy of Maca in women. Menopause. 2016;23(9):1000–1006.
[8]. Wang S, Zhu F. Chemical composition and health effects of Maca (Lepidium meyenii). Food Chem. 2019;288:422–443.
[9]. Beharry S, Heinrich M. Is the hype around Maca justified? J Ethnopharmacol. 2018;211:126–170.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, June 2026
Impact Factor: 8.2

[10]. Latif R. Chocolate/cocoa and human health: a review. Neth J Med. 2013;71(2):63–68.
[11]. Afoakwa EO. Chocolate Science and Technology. 2nd ed. Oxford: Wiley-Blackwell; 2016.
[12]. Allen LV, Popovich NG, Ansel HC. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems. 11th ed. Philadelphia: Wolters Kluwer Health; 2021.
[13]. Khinchi MP, Patel MB, Bhatt P, Patel BG. Formulation, development and evaluation of orally disintegrating tablets of meloxicam, Journal of Pharmacy Research, 2011;4(4):1250-1252.
[14]. Pahwa R, Piplani M, Sharma PC, Kaushik D, Nanda S. Orally disintegrating tablets–friendly to pediatrics and geriatrics, Archives of Applied Science Research, 2010;2(2):35-48.
[15]. Beckett ST., Industrial chocolate manufacture and use: Recent developments in chocolate coating technology, Manufacturing Confectioner, 2012;92(4):49-56.
[16]. 4. Afoakwa EO, Paterson A, Fowler M. Factors influencing rheological and textural qualities in chocolate products, Trends in Food Science & Technology, 2007;18(6):290-298.
[17]. 5. Shangraw RF, Mitrevej A, Shah M., A new era of tablet disintegrants, Pharmaceutical Technology. 1980;4(10):49-57.
[18]. Gohel MC, Jogani PD., A review of co-processed directly compressible excipients, Journal of Pharmacy and Pharmaceutical Sciences, 2005;8(1):76-93