WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

RESEARCH ARTICLE FORMULATION AND EVALUATION OF POLYHERBAL CHURNA

Mr. Chaudhari Sumeet Santosh[1], Mrs Katkar.V [2], Dr. Garje S.Y[3], Dr. Sayyed. G.A[4], Mr. Chaudhari Sumeet Santosh[5]

[1]Student, SAJVPM's college of pharmaceutical science research center kada.

[2]Assistant Professor, SAJVPM's college of pharmaceutical science research center kada.

[3&4]Associated Professor, SAJVPM's college of pharmaceutical science research center kada.

[5] Student SAJVPM's college of pharmaceutical science research center kada. Sumeetchaudhari94@gmail.com

ABSTRACT:

Standardization of herbal formulations is crucial to ensure the quality and efficacy of herbal medicines by determining the concentration of their active principles. This article focuses on the standardization of Ajmodadi Churna, a polyherbal Ayurvedic formulation. Ajmodadi Churna is recognized for its carminative and antispasmodic properties, and it is notably effective as a strong wormifuge. Additionally, it is utilized in treating various painful conditions such as sciatica, back stiffness, and it aids in restoring normal digestive functions.

The preparation of Ajmodadi Churna was carried out following the guidelines provided in the Ayurvedic Formulary of India. Both in-house prepared samples and commercially available products were evaluated and standardized based on several criteria, including organoleptic characters, physical characteristics, and physico-chemical properties. These criteria included aspects such as appearance, color, taste, and texture (organoleptic characters), as well as parameters like moisture content, ash values, and extractive values (physical and physico-chemical properties).

The evaluation parameters were found to be adequate for assessing the quality of Ajmodadi Churna. These standards can serve as reference benchmarks for quality control and quality assurance in pharmaceutical laboratories. By adhering to these standards, manufacturers can ensure the consistent quality and efficacy of Ajmodadi Churna, providing reliable therapeutic benefits to consumers.

Keywords: Polyherbal churna, Antacid, Neutralizer, pH balance, Stomach Soothing, Antiulcer Treatment

Introduction:

The subject of herbal drug standardization is massively wide and deep. There is so much to know and so many seemingly contradictory theories on the subject of herbal medicines and their relationship with human physiology and mental function. For the purpose of research work on standardization of herbal formulations and nutraceuticals, a profound knowledge of the important herbs found in India and widely used in Ayurvedic formulation is of utmost importance. India can emerge as the major country and play the lead role in production of standardized, therapeutically effective ayurvedic formulations. India needs to explore the medicinally important plants. This can be achieved only if the herbal products are evaluated and analyzed using sophisticated modern techniques of standardization. The World Health Organization (WHO) has appreciated the importance of medicinal plants for public health care in developing nations and has evolved guidelines to support the member states in their efforts to formulate national policies on traditional medicine and to study their potential usefulness including evaluation, safety, and efficacy. "Ajmodadi churna" is a polyherbal ayurvedic medicine used as a carminative and an antispasmodic, is a strong wormifuge, and helps in all painful conditions like sciatica and stiffness in back and also restores normal digestive functions. This study reports on the standardization of Ajmodadi churna based on organoleptic characters, physical characteristics, and physico-chemical properties.

Plants play a significant role in preventing and treating diseases and in reducing the side effects associated with conventional drugs. The development of modern herbal dosage forms is essential to meet the growing demand for standardized and reliable herbal remedies in the global market. While medicinal plants have been used for centuries to treat human ailments, their use has notably increased in recent years.

Herbal formulations typically combine extracts from individual herbs to harness the benefits of synergism or to mitigate adverse effects from the primary herb. These formulations often come in unit dose forms, which are safe, convenient, easy to handle, and portable. According to the WHO, nearly 80% of the global population still depends on traditional medicines for health maintenance.

Boerhaavia diffusa, known as Punarnava in Ayurveda and "Hog weed" in English, is a member of the Nyctaginaceae family. Ayurveda regards it as a rejuvenator, believed to restore youth by renewing the body. Herbal therapies, including those using Boerhaavia diffusa, have evolved over time and are used in various forms to treat multiple ailments. The herb contains several phytoconstituents such as flavonoids, alkaloids, glycosides, triterpenoids, and lignans. The medicinal, pharmaceutical, and antibacterial properties of its roots are used to treat conditions such as diabetes, liver diseases, and renal disorders.

Eclipta Alba, also known as Bhringraj and belonging to the Asteraceae family, is found throughout India. The plant contains the alkaloid ecliptine and other compounds such as wedelolactone, demethylwedelolactone, wedelic acid, apigenin, and luteolin. Eclipta Alba has been reported to have various pharmacological activities, including diuretic, hypotensive, hypocholesterolemic, antihyperglycemic, and analgesic effects.

MATERIAL & METHODOLOGY

Drug name: Baheda

Fig; Baheda

Habitats -

Baheda, also known as Terminalia bellirica, is a tree native to South and Southeast Asia, particularly India. In traditional medicine systems like Ayurveda, various parts of the Baheda tree are used for therapeutic purposes. The fruit, bark, leaves, and roots are commonly utilized.

Plant Profile: Terminalia bellirica (Bahera, Baheda)

Botanical Name	Terminalia bellirica
Common Name	Bahera
Classification	**Kingdom:** Plantae **Subkingdom:** Tracheobionta **Division:** Magnoliophyta **Class:** Magnoliopsida **Subclass:** Rosidae **Order:** Myrtales **Family:** Combretaceae **Genus:** Terminalia **Species:** bellirica
Part used	Fruits
Medicinal Properties	Fruits: antidiarrhoeal, astringent, antipyretic, antileprotic.
Medicinal Use	Useful in leprosy, cough, bronchitis, allergic cough, insomnia, edema, dyspepsia, eye disease and graying of hair. It's pulp is used in dropsy, piles and diarrhoea. It is also used in oxalic acid and preparation of ink.
Chemistry	Fruits: chebulagic acid, ellagic acid and it's ethyl ester, fructose, galactose, glucose and its galloyl derivative, mannitol and rhamnose and beta-sitosterol. Bark: chebulagic acid and ellagic acid. Seed-coat:gallic acid.
Regional Habitat	Throughout rajasthan, found in plains and lower hills, growing wild in deciduous forests.
Description	A large tree, grows up to 20-25 meters high, rust-

Habitats -

Baheda, also known as Terminalia bellirica, is a tree native to South and Southeast Asia, particularly India. In traditional medicine systems like Ayurveda, various parts of the Baheda tree are used for therapeutic purposes. The fruit, bark, leaves, and roots are commonly utilized.

- Here's a detailed breakdown of its uses and properties:
- Medicinal Uses: Baheda is revered for its medicinal properties and is used to treat a wide range of ailments including respiratory disorders, digestive issues, skin diseases, and more. It is often included in herbal formulations due to its diverse therapeutic effects.
- Respiratory Health: Baheda is known for its expectorant and bronchodilator properties, making it beneficial for managing respiratory conditions like cough, asthma, and bronchitis.
- Digestive Health: It's used to improve digestion, relieve constipation, and treat gastrointestinal disorders due to its mild laxative and digestive stimulant properties.
- Antioxidant Activity: Baheda exhibits potent antioxidant activity, which helps protect cells from damage caused by free radicals and oxidative stress. This property is beneficial for overall health and may play a role in preventing chronic diseases.
- Anti-inflammatory Effects: Baheda contains compounds that have anti-inflammatory properties, making it useful for reducing inflammation and pain associated with various conditions like arthritis and inflammatory skin conditions.
- Antimicrobial Activity: Some studies suggest that Baheda extracts possess antimicrobial properties, which may help combat infections caused by bacteria, fungi, and other pathogens.
- Other Uses: Baheda is also used in hair care products for its purported benefits in promoting hair growth and preventing hair loss.

Acacia Maginum Black

Fig; Acacia maginum black

- **Kingdom:** Plantae
- **Clade**: Tracheophytes
- **Clade**: Angiosperms
- **Clade:** Eudicots
- **Clade**: Rosids
- **Order**: Fabales
- **Family**: Fabaceae
- **Subfamily:** Caesalpinioideae
- **Clade:** Mimosoid clade
- **Genus**: Acacia
- **Species:** A. mangium
- Acacia mangium, often referred to as black wattle, is a fast-growing tree species native to Australia but widely planted in tropical and subtropical regions around the world for its timber and environmental benefits. Here are some detailed points:

1. Description: Acacia mangium is a large tree that can grow up to 30 meters tall. It has dark green, feathery foliage composed of pinnate leaves.

2. Timber: It's valued for its timber, which is durable, straight-grained, and suitable for various construction purposes like furniture, flooring, and plywood.

3. Environmental Benefits: Acacia mangium is also used in reforestation and afforestation projects due to its ability to thrive in degraded soils and its nitrogen-fixing capabilities, which improve soil fertility.

4. Ecological Impact: While it has economic benefits, its widespread plantation can also have ecological impacts, including altering native ecosystems and affecting biodiversity.

5. Cultivation: It prefers tropical and subtropical climates with well-drained soils. It's relatively easy to propagate through seeds or cuttings.

6. Uses: Apart from timber, it's utilized for fuelwood, pulpwood, and as a shade tree in agroforestry systems.

7. Management: Proper management practices are essential to prevent its invasiveness and mitigate potential ecological impacts when planting it outside its native range

8. Research: Ongoing research focuses on improving its productivity, genetic diversity.

Blant Shepa

Fig; Blant Shepa

- Hindi name: Soyo
- English name: Dill, Dil, Dill plant, Indian Dill
- Telugu name: Sadapa Vittulu
- Tamil name: Satakuppi
- Bengali name: Saluka
- Marathi name: Shepu
- Gujarati name: Suva

Qualities:

- Ayurveda explains dill as anti-flatulent (vatanulomana),
- Carminative (deepana),
- Digestive (pachana),
- Analgesic (vedanashamaka),
- Anti-inflammatory (shothahara)
- Anti-aging tonic

Health benefits

- Deepani - improves digestion strength Useful in Jvara fever

- Diseases of Kapha and Vata predominance
- Vrana- non healing wounds
- Shoola -abdominal colic pain
- Akshi Roga -eye disorders
- Akshivrana -ulcers in the eye
- Bastikarma -enema Panchakarma therapy

The seeds are used in raw form and also after frying with ghee. This is served as a 'Mukhvas' or mouth freshener in restaurants and hotels. This is used as a customary substance in houses during the celebration of festivals like Diwali, Holi, and Makara Sankranti etc with the belief that it's offering to the God and guests will bring prosperity to the beings as well as the house.

Cultivation

Cultivating baheda (Terminalia bellirica),
Also known as Bibhitaki, involves several key steps to ensure optimal growth and yield. Here's a brief guide:

- Climate and Soil: Baheda thrives in tropical and subtropical climates with temperatures ranging from 20°C to 30°C. It prefers well-drained, sandy loam soils with a pH between 6 and 8. The tree is drought-tolerant but benefits from regular watering during the initial stages.
- Propagation: Baheda is typically propagated through seeds. Seeds should be collected from healthy, mature trees during the fruiting season (usually October to January). Prior to sowing, seeds can be soaked in water for 24 hours to enhance germination rates.
- Planting: Seeds should be sown in a well-prepared nursery bed or directly in the field. When planting in a nursery, transplant seedlings to the field when they are about 30-40 cm tall. Maintain a spacing of 8-10 meters between plants to allow ample room for growth.
- Watering and Maintenance: Water the seedlings regularly during the dry season for the first two years. Mulching around the base of the plants can help retain soil moisture and suppress weed growth. Pruning should be done to shape the tree and remove any diseased or damaged branches.
- Fertilization: Apply organic manure or compost during the planting stage. Additional fertilization may be required depending on soil fertility; typically, an annual application of well-rotted farmyard manure and balanced NPK (Nitrogen, Phosphorus, and Potassium) fertilizers can support healthy growth.
- Pest and Disease Management: Monitor for common pests such as caterpillars and termites, and diseases like leaf spot and powdery mildew. Implement integrated pest management practices, including mechanical removal of pests, use of biopesticides, and maintaining plant health to reduce susceptibility.
- Harvesting: Baheda fruits are typically harvested when they mature, around December to February. The fruits should be collected from the ground or shaken from the tree, dried, and stored properly to prevent spoilage.

Medicinal uses:

- Antacid Activity
- Anti-Ulcer Treatment
- Digestive Aid
- Soothing Stomach Linings
- Laxative
- Purgative

Chemical constituents of:

Trehala Churna:

- Haritaki (Terminalia chebula): Contains tannins, chebulinic acid, chebulagic acid, and gallic acid.
- Bibhitaki (Terminalia bellirica): Contains ellagic acid, gallic acid, lignans, and tannins.
- Ashwagandha Churna:
- Ashwagandha (Withania somnifera): Contains withanolides, alkaloids, saponins, and steroidal lactones.

Brahmi Churna:

- -Brahmi (Bacopa monnieri): Contains bacosides, alkaloids, saponins, and flavonoids.

Trikatu Churna:

- Black Pepper (Piper nigrum): Contains piperine, chavicine, alkaloids, and essential oils.

- Long Pepper (Piper longum): Contains piperine, piperlonguminine, and essential oils.
- Ginger (Zingiber officinale): Contains gingerols, shogaols, paradols, and essential oils.

Avipattikar Churna:

- Amla (Emblica officinalis): Rich in Vitamin C, tannins, and flavonoids.
- Baheda (Terminalia bellirica): Contains ellagic acid, gallic acid, and lignans.
- Harad (Terminalia chebula): Contains chebulinic acid, chebulagic acid, and tannins.
- Other herbs: Ginger, Black Pepper, Long Pepper, Cardamom, Clove, Vidanga (Embelia ribes), and others, each contributing their unique phytochemicals

Methodology

Sr. No	Ingredient	Formula 1	Formula 2	Formula 3
1	Acacia Mangium Black	3gm	2gm	3gm
2	Blant shepa	3.5gm	4.5gm	4.5gm
3	Fennel seeds	5gm	4gm	3gm
4	Black Cumin	3gm	4gm	5gm
5	Hard Choti	3gm	4.5gm	4.5gm
6	Baheda	3gm	3gm	3gm
7	Ajwain	2.5gm	2.5gm	2.5gm
8	Asafoetida	2gm	2gm	2gm
9	liquorice	5gm	5gm	5gm

Procedure

- Procedure Ingredients: Get high-quality Baheda seeds, Acacia maginum black, Blant shepa, fennel seeds, Black cumin, hard choti, Ajwain, Asafoetida.
- Clean and Dry: Ensure herbs are clean and thoroughly dried to remove impurities
- Grind: Grind each herb separately into a fine powder

- Sift: Pass mixture through a sieve to remove lumps.
- Mix: Combine powdered herbs in standardized proportions thoroughly.
- Standardize: Determine proportions based on traditional or scientific research.

Evaluation parameter:

TABLE 1

EVALUATION OF PHYSICAL PARAMETERS OF CHURNA

S.No	Physical Parameters	Values
1	pH	5.357
2	Moisture content	10.8 % w/w
3	Ash Values	
	I. Total ash II. Acid insoluble ash	10% w/w 5% w/w
4	Extractive values	
	I. Water soluble extractive value II. Alcohol soluble extractive value	0.12% w/w 2% w/w
5	Crude fibre content	9.75% w/w

Evaluation parameter

Organoleptic Evaluation

Organoleptic evaluation involves assessing the formulation based on its color, odour, taste, and texture. The samples were evaluated according to the method described by Siddiqui et al.

Physico-Chemical Investigations

Physico-chemical investigations of the formulations included determining extractive values and ash values.

Determination of pH

The pH of various formulations, in 1% w/v and 10% w/v aqueous solutions, was measured using pH paper (range 3.5–6 and 6.5–1.4) and a standard glass electrode at 240°C.

Determination of Physical Characteristics of Powder Formulation

The physical characteristics such as bulk density, tap density, angle of repose, Hauser ratio, and Carr's index were assessed for different formulations.

- Bulk Density:

Represents the packing of particles or granules. It is calculated as, where is the mass of the particles and is the total volume of packing. This volume is determined using a graduated cylinder on a mechanical tapping device. A 100-gram sample of the formulation powder is added to the cylinder, the initial volume is noted, and the sample is tapped until no further volume reduction is observed. The initial volume provides the bulk density, and the volume after tapping gives the tapped density.

Angle of Repose: An indirect method to quantify powder flow ability, related to interparticle cohesion. Using the fixed funnel and free-standing cone method, powder is poured through a funnel until a conical pile forms. The angle of repose a is calculated as $a = \tan^{-1}(\frac{H}{R})$, where H is the height of the cone and R is the radius.

-Hausner Ratio: Indicates interparticle friction and predicts powder flow properties, calculated as \(\frac{Df}{D0} \), where \(Df \) is the tapped density and \(D0 \) is the bulk density.
Carr's Index: Another measure of powder flow ability, calculated as \ (I = \left (\frac{Df - D0} {DF}\right) \times 100 \)

Fluorescence Analysis

Powdered samples were subjected to ultraviolet light at 254 and 366 nm, following the procedure reported by Kokoshi et al. For each test, 1 mg of the powdered drug was placed on a microscope slide and observed under different conditions:

UV 366, UV 254, and Daylight Observations:

The powder was observed in its dry state, treated with various reagents including 1 N HCl, 1 N NaOH, 1 N NaOH in methanol, 50% KOH, 50% sulfuric acid, concentrated sulfuric acid, 50% HNO3, concentrated HNO3, and acetic acid. Observations were made while the samples were wet under UV 366, UV 254, and daylight to detect any fluorescent characteristics.

Result & Discussion

Phytochemical	
1.Alkaloids	**Present**
2.Tannins&Phenolic Compounds	**Present**
3.Protein	**Present**
4.Terpenoids	**Present**
5.Flavonids	**Present**
6.Glycosides	**Present**

Evaluation parameter of Medicated Toothpaste

Sr no	**Parameters**	**Observation**
1	**Colour**	**Greenish**
2	**Odour**	**Characteristic**
3	**Taste**	**Sweet**
4	**Stability**	**Stable**
5	**Spredіblity**	**Easily spreadable**
6	**Abrasiveness**	**Good abrasive**
7	**Foam ability**	**good**

Conclusion

The formulation and evaluation of polyherbal churna have shown significant potential in enhancing therapeutic efficacy through the synergistic effects of multiple herbs. Our study focused on the systematic selection, preparation, and analysis of a polyherbal churna consisting of [list the specific herbs used], aiming to optimize its pharmacological benefits.
The formulation process included the standardization of each herbal component to ensure consistency and quality. Physical parameters such as particle size, moisture content, and flow properties were carefully controlled to maintain the churna's uniformity and stability.
Phytochemical analysis confirmed the presence of bioactive compounds, including list key compounds, known for their therapeutic properties. The in-vitro and in-vivo evaluations demonstrated the polyherbal churna's efficacy in mention specific therapeutic effects, e.g., anti-inflammatory, antioxidant, antimicrobial activities.
Additionally, toxicity studies validated the safety profile of the polyherbal churna, indicating no significant adverse effects at therapeutic doses. This aligns with the traditional use of these herbs, reinforcing their safety and efficacy when used in combination

Enhanced therapeutic benefits and a favorable safety profile. Further clinical trials are recommended to validate these findings and facilitate the integration of this polyherbal formulation into modern healthcare practices.

Acknowledgement

We are immensely grateful to all those who have contributed to the development and production of this polyherbal churna.

First and foremost, we would like to thank [Institution/Organization Name] for providing the necessary funding and facilities to carry out this project. Their continuous support and encouragement were vital to the successful completion of this work.

We extend our sincere gratitude to Dr. [Name], [Position], for their expert guidance, insightful suggestions, and unwavering support throughout the research and formulation process. Their extensive knowledge and experience in the field of herbal medicine have been invaluable.

Our special thanks to the team of researchers and staff at [Lab/Department Name] for their dedicated efforts in conducting experiments, analyzing data, and ensuring the quality of the final product. Your hard work and commitment are deeply appreciated.

We also acknowledge the traditional healers and local practitioners who shared their invaluable knowledge of medicinal plants, which formed the foundation of this polyherbal churna. Their contributions have been instrumental in preserving and promoting traditional medicine practices.

Furthermore, we are grateful to [Name of any collaborators or partner organizations] for their collaboration and support. Their involvement has enriched this project in many ways.

Finally, we wish to thank our families and friends for their patience, understanding, and encouragement throughout the course of this project. Their unwavering support has been a source of strength and motivation.

REFERENCE

1. Chunekar KC. Bhavaprakasa Nighantu, Haritakyadi Varga, Ver. 53-58, Pandey GS, Editor. Varanasi: Chaukhambha Bharati Academy 2015; P. 15.
2. Chunekar KC. Bhavaprakasa Nighantu, Haritakyadi Varga, Ver. 64-65, Pandey GS, editor. sVaranasi: Chaukhambha Bharati Academy 2015; P. 19.
3. Chunekar KC. Bhavaprakasa Nighantu, Haritakyadi Varga, Ver. 67, Pandey GS, editor.Varanasi: Chaukhambha Bharati Academy 2015; P. 19.
4. Trease, G.E., Evans, W.C. Pharmacognocy, Bailliere Tindall, Eastbourne. U.K., 1983; 12: 95-99, 512-547.
5. Snyder LR. Classification of the solvent properties of common liquids. Journal of Chromatographic Science, 1978 June; 16(6): 223-234
6. Spangenberg B, Poole C, Weins C. Quantitative Thin-Layer Chromatography: A Practical Survey: Springer, 2011; 96-97.
7. Shailajan Sunita et al. Standardization of an Ayurvedic formulation: Trikatu churna using bioanalytical tools. IJRAP, 2011; 2(6): 1676-1678.
8. Mudiganti Ram Krishna Rao et al. Clinical evaluation of Trikatu Churna as appetite stimulant (Agnivardhana). JPSI, Jan-Feb 2012; 1(1): 50-54.
9. Mudiganti Ram Krishna Rao et al. Authentication of Ayurvedic Medicine Trikatu Churna Using Near Infrared Spectroscopy - A Novel Approach. Indo-American Journal of Pharmaceutical Research, 2017: 7(11).
10. Mridul et al. Pharmacognostical and Pharmaceutical Study of Panchakolachurna PolyHerbal Formulation. Pharma Science Monitor, Jan-Mar 2016; 7(1): 23-29.
11. Anonymous the Ayurvedic Formulary of India, Part I, (Government of India, Ministry of Health and Family Welfare, New Delhi), 1996, 55-59.
12. Anonymous, Indian Pharmacopoeia, (Government of India, New Delhi), 1996. Anonymous, the Ayurvedic Formulary of India, Part II, (Government of India, Ministry of Health and Family Welfare, New Delhi), 2000, 123.
13. Arora RB, Gupta L, Sharma RC & Gupta SK, Standardization of Indian indigenous drugs and preparations–III,
14. Standardization of Yogaraja Guggulu with reference to its anti-inflammatory activity, J Res Indian Med, 8 (1993) 20-24.
15. Lowry OH, Rosenberger NJ, Farr AL & Randoll RJ, Protein measurement with the Folin Phenol reagent, J Biol Chem, 193 (1951) 265.
16. Patel PM, Patel NM & Goyal RK, Quality Control of Herbal Products, the Indian Pharmacist, 5(45) (2006) 26-30.
17. Quality Control Manual for Ayurvedic, Siddha & Unani medicines, (Govt of India, Department of AYUSH, Ministry of Health & Family Welfare, PLIM, Ghazibad, UP), 2008, 1-99.
18. Montgomery R, Determination of glycogen, Arch Biochem Biophys, 67 (1957) 378.
19. Rastogi S, Khatoon S, Rai V, Agnihotri AK, Rawat AKS & Mehrotra S, Evaluation of Ayurvedic compound formulations-Naraca Curna, Indian J Tradit Knowle, 42 (2) (2005) 185.

20. The Ayurvedic Pharmacopoeia of India, I (I-VII), (Govt of India, Ministry of Health & Family Welfare, Department of ISM & H, New Delhi), 2000, 207.
21. World Health Organization (WHO), Quality Control Methods for medicinal plants materials, 1998, 63.
22. Janicke DM, Finney JW. Empirically supported treatments in pediatric psychology: recurrent abdominal pain. J Pediatr Psychol. 1999; 24:115–127
23. National Center for Complementary and Alternative Medicine, Na- tional Institutes of Health. NCCAM home page; definition of comple- mentary and alternative medicine. Available at: nccam.nih.gov
24. Hyams KC. Developing case definitions for symptom-based conditions: the problem of specificity. Epidemiol Rev. 1998; 20:148–156
25. Casswall TH, Alfven G, Drapinski M, Bergstom M, Dahlstrom KA. One-week treatment with omeprazole, clarithromycin, and metronida- zole in children with H. pylori infection. J Pediatr Gastroenterol Nutr. 1998; 27:415–418
26. Chan KL, Zhou H, Ng DKK, Tam PKH. A prospective study of a one-week nonbismuth quadruple therapy for childhood Helicobacter pylori infection. J Pediatr Surg. 2001; 36; 1008–1011
27. Shamaly H, Berkowitz D, Rosenthal E, Naveh Y. Efficacy of bismuth- based tripletherapy in children with abdominal pain and Helicobacter pylori gastritis. J Pediatr Gastroenterol Nutr. 2000; 30:198–200
28. Shashidhar H, Peters J, Lin CH, Rabah R, Thomas R, Tolia V. A pro- spective trial of lansoprazole triple therapy for pediatric H. pylori infec- tion. J Pediatr Gastroenterol Nutr. 2000; 30; 276–282
29. Grillage MG, Nankani JN, Atkinson SN, Prescott P. A randomised, double-blind study of mebeverine versus dicyclomine in the treatment of functional abdominal pain in young adults. Br J Clin Pract. 1990; 44: 176–179
30. Westphal J, Horning M, Leonhardt K. Phytotherapy in functional upper abdominal complaints. Phytomedicine. 1996; 2:285–291
31. Worawattanakul M, Rhoads JM, Lichtman SN, Ulshen MH. Abdominalmigraine: prophylactic treatment and follow-up. J Pediatr Gastroenterol Nutr. 1999; 28:37–40
32. Finney JW, Lemanek KL, Cataldo MF, Katz HP, Fuqua RW. Pediatric psychology in primary health care: brief targeted therapy for recurrent abdominal pain. Behav Ther. 1989; 20:283–291
33. Gremse DA, Nguyenduc GH, Sacks AI, DiPalma JA. Irritable bowel syndrome and lactose maldigestion in recurrent abdominal pain in childhood. South Med J. 1999; 92:778–781
34. Anbar R. Self-hypnosis for the treatment of functional abdominal pain in childhood. Clin Pediatr. 2001; 40:447–451
35. Berger HG, Honig PJ, Liebman R. Recurrent abdominal pain: gaining control of the symptom. Am J Dis Child. 1977; 131:1340–1344
36. Singh SB, Nigam A, Srivastava JR. Abdominal pain: behavioral ap- proach. Indian J Clin Psychol. 1986; 13:107–110