A Review on: Carica Papaya Used as Herbal Medicine in Primary Dysmenorrhoea.

Ms. Priyanka S. Sawarkar
priyankasawarkar05@gmail.com

DOI: 10.29322/IJSRP.10.09.2020.p105106
http://dx.doi.org/10.29322/IJSRP.10.09.2020.p105106

Abstract- Dysmenorrhea influences, women's daily chores, restriction in social or functional activities, it affects their attendance in school and colleges. Many of them try to indulge in home remedies and analgesics without prescription. Throughout the world herbal medicines are used as an alternative treatment which is rising rapidly and it is universally accepted. Primary dysmenorrhea releases the excessive amount of prostaglandin in the blood. ***Carica papaya linn*** plant is also called as Paw-paw, belonging to family Caricaceae. The fruits of ***Carica papaya*** help in contracting the uterus muscle, which eases the painful flow during the menstruation, in addition to that contains carotene, that help in regulating the hormone estrogen in the body, which causing regular period. Prostaglandin and menstrual pain can be reduced by Papaya leaf extract. The leaves of ***Carica papaya*** contain flavonoids which has anti-inflammatory activity. Flavonoid can inhibit the enzyme cyclooxygenase-I which is the first phase of pain mediation synthesis and prostaglandin that affect the decrease in the intensity of menstrual pain. Papaya leaves also contain Vitamin -E that act as suppressor to the enzyme activity of phospholipase A and cyclooxygenase post translational activation that reduce prostaglandin production. Vitamin E increases the production of prostacyclin and PGE2 which act as vasodilators that relaxes the uterine muscle. Hence, complete study of this paper is to review the effect of ***Carica papaya linn*** plant on menstrual pain and reduces the level of prostaglandin in primary dysmenorrhoea.

Keywords: *Primary Dysmenorrhoea, Carica papaya, Prostaglandin, Vitamin -E, Flavonoid.*

INTRODUCTION

WOmen is a wonderful creation of a god, who plays a tremendous role such as a mother, wife, daughter, home maker and daily wage earner. Menstruation is a natural phenomenon which occur throughout the reproductive years of females, but most of them suffer from certain level of pain during menstrual period, this is called menstrual disorder. Dysmenorrhoea is related with a pain associated with menstruation. This is the common problem in adolescent girls and in women of reproductive age, who are going through pain for 1-2 days of every month. Generally, women suffer from sweating, headache, nausea, vomiting, diarrhea during the menstrual period. Dysmenorrhoea causes mental problems, that leads females to be in solitude and limited their participation in different social or functional activities. Menstrual pain can be minimized by nonpharmacological therapies rather than medicines. ***Carica papaya*** is commonly used as herbal medicine in menstrual pain which are affordable and alternative treatment. The various part of the papaya like seeds, fruits, leaves, leaves extract and latex exhibited medicinal properties that help to relieve menstrual pain. Papaya leaves contain flavonoids which perform anti-inflammatory activity that retard the action of the enzyme cyclooxygenase-I, which is the first phase of pain mediation synthesis such as prostaglandin, that decrease the intensity of pain in menstruation. The aim of this paper is to review and examine that ***Carica papaya*** is the herbal product that contains analgesic and anti-inflammatory activity which are essential in curing the menstrual pain and retain good health in women.

DYSMENORRHOEA

Dysmenorrhea derived from Greek word meaning is "difficult monthly flow." Dysmenorrhea is a term describing painful menstruation that involved cramps caused by uterine contraction. Women with dysmenorrhea have reduced sleep quality, quality of life, physical activity, mood swings in painful period. Diarrhea, vomiting, headache, dizziness, pain in abdomen and thighs. These are the common symptoms observed during or before menstruation start.

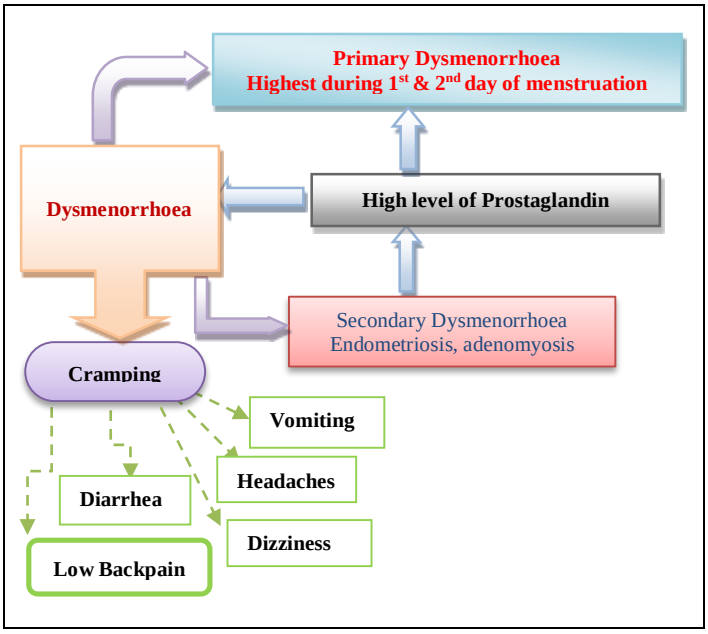


Fig. 1: Dysmenorrhoea and its types.

TYPES OF DYSMENORRHEA

Dysmenorrhea commonly categorized into two types:

- **Primary dysmenorrhoea**
- **Secondary dysmenorrhea.**

PRIMARY DYSMENORRHOEA

Primary dysmenorrhoea is neither physical disorder nor due to presence of other diseases but it is recurrent. It is a spasmodic cramping pain in the lower abdomen, which occurs during menstruation. Pain usually begins 1 or 2 days before menstruation or when menstrual bleeding start. It is a cramping pain in the lower abdomen occurring during menstruation. The menstrual pain can be mild to severe and sustained for 12 to 72 hours. The symptoms such as sweating, headache, low backpain, diarrhea, vomiting, nausea usually appear just before or during the menstruation and persist during the first day or two or three days of menstruation.

3.PATHOPHYSIOLOGY OF PRIMARY DYSMEORHHEA

A) Mechanism of Pain in Primary dysmenorrhoea.

The origin of pain in pelvis in Primary dysmenorrhoea due to the increased uterine production and released of prostaglandin level during menstrual period. Prostaglandin induces abnormal uterine activity which causes uterine ischemia and pain shown in **Fig. 2**. The increased in uterine activity and uterine ischemia are two important aspect in the generation of pain. In primary dysmenorrhoea, the uterine cramps and pain are associated with the release of prostaglandin in menstruation and the reduction of uterine flow with the increase of abnormal uterine activity.

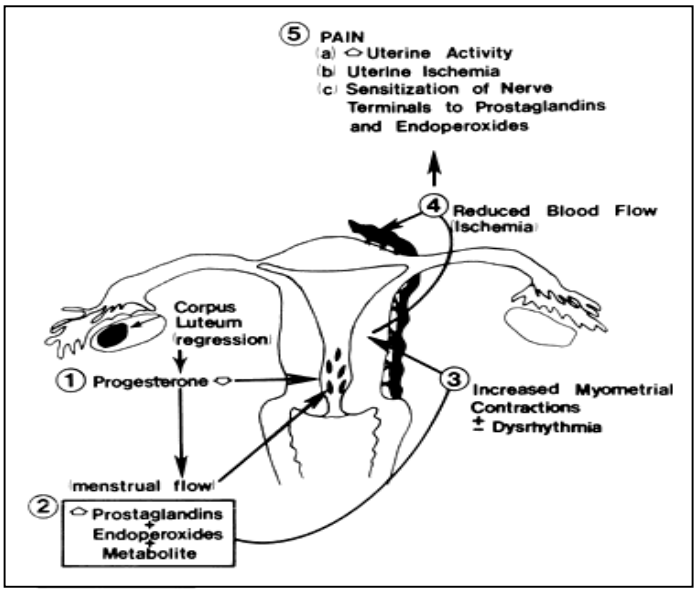


Fig. 2: Mechanism of Pain in Primary dysmenorrhoea.

B) Prostaglandin causes Primary Dysmenorrhea

Primary dysmenorrhea causes due to excessive level of prostaglandin hormone. Prostaglandin made in the lining of the uterus, that makes uterus contract during menstruation or child birth. A few days before the menstruation start, prostaglandin start accumulating in the endometrium cell, which begin to break down during menstrual blood flow and release large amount of prostaglandin. Endometrium and myometrium can synthesize leukotrienes, in the 5-lipooxygenase pathway and that leukotrienes are involved in myometrial contractions. Endometrium and myometrium can synthesize leukotrienes, in the 5-lipoxygenase pathway and that leukotrienes are involved in myometrial contractions. In primary dysmenorrhea, there are usually higher concentrations of menstrual leukotrienes, especially leukotriene C4 and leukotriene D4, without dysmenorrhea in women. Because specific binding sites for leukotriene C4 are demonstrable in myometrial cells, it is likely that leukotrienes contribute to the uterine hypercontractility occur in primary dysmenorrhea. The Release of prostaglandin constrict the blood vessels in the uterus and make the muscle layer contract, causing painful cramps. The biosynthesis of prostaglandins is summarized in **Fig. 3**. Prostaglandin Synthesized from arachidonic acid and eicosatrienoic acid, which are often derived from conversion of phospholipids A, triglycerides, and cholesterol esters by the enzyme acyl hydrolase. Prostaglandins are produced under the influence of cyclooxygenase (COX) isomerase and reductase which are collectively called as prostaglandin synthetase. These are involved in the biosynthesis of $PGF_{2\alpha}$ and PGE_2. Availability of arachidonic acid, endometrial cellular trauma, and availability and inducibility of COX, are important factors that stimulate the generation prostaglandin production.

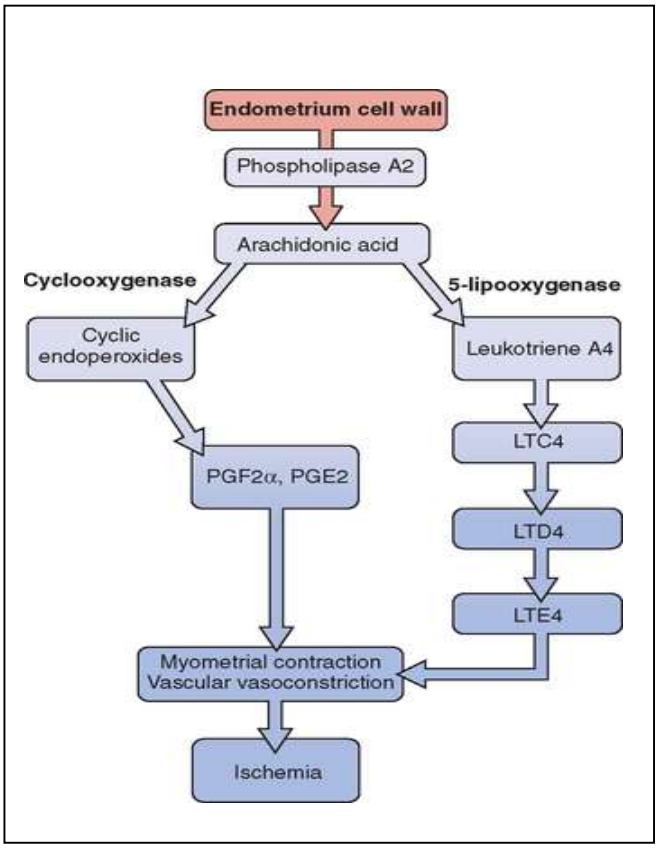


Fig. 3: Biosynthesis of Prostaglandin in Primary dysmenorrhoea.

SECONDARY DYSMONORRHEA

Secondary dysmenorrhoea is caused by a disorder in the reproductive system, pain that is caused by a disorder in the woman's reproductive organs, such as endometriosis, adenomyosis, uterine fibroids, or infection. The pain of secondary dysmenorrhoea often last longer than menstrual cramps. For instance, it may begin a few days before a menstrual period starts.

TREATMENT FOR PRIMARY DYSMENORRHEA

Those women who suffers from primary dysmenorrhea, are advised to first check through physician, that their period pain is not caused by certain reproductive disorders like endometriosis, uterine fibroids or by other diseases.

Treatment option for dysmenorrhoea, that may be –

- Pain killer or analgesic medication,
- Anti-inflammatory medication,
- Contraceptive pills,
- Rest during period, Regular exercise or
- **Herbal medicines to treat menstruation pain**

HERBAL MEDICINE USED TO TREAT PRIMARY DYSMENORRHEOA – *CARICA PAPAYA*

Herbal plants are used by most of the women to relive menstrual cramps or pain during monthly period, because use of these natural herbal medicines safe and have no side effects than the chemical drugs. Therefore, ***Carica papaya*** is alternative and most effective treatment of menstrual pain in women. The different parts of the ***Carica papaya*** plant including leaves, seeds, latex and fruit exhibited to have medicinal value.

Fig. 4: *Carica Papaya* plant

Carica papaya Linn is also known as Paw-Paw, belonging to family Caricaceae. It is Herbaceous and perennial plant. Various part of ***Carica papaya*** contain active substances that can be used for therapeutic purposes or which are the precursors for the synthesis of useful drugs. The medicinal values of this plants due to containing chemical substances that produce definite physiological action on the human body.

A. CHEMICAL COMPOSITION OF CARICA PAPAYA

Every part of the ***Carica papaya*** containing essential chemical composition which are plays an important role to treat the various diseases. Each part of the papaya is an abundant source of enzymes, alkaloids, proteins, fibres, glycosides, vitamins which provide medicinal value to the papaya are summarised in a **Table I.**

Table I: Chemical Composition of *Carica papaya.*

Part of Plant	Chemical Component
SEEDS	papaiya oil, carpaine, benzyl isothiocyanate, benzyl thiourea, β-sitosterol, caricin, enzyme myrosin, Fatty acid, crude fiber, crude protein
ROOTS	Caproside and enzyme myrosin
LEAVES	Alkaloids carpaine, pseudocarpaine, dehydrocarpaine 1,2, choline, caproside, vitamin C and E.
FRUITS	Protein, fat, carbohydrates, minerals, vitamins, volatile compound, alkaloids, glycosides
BARK	β-sitosterol, glucose, fructose, galactose, xylitol
JUICES	N-butyric, n-hexanoic and n-octanoic acid, lipid, myristic, palmitic, stearic, linolenic acid, oleic acid
LATEX	Proteolytic enzyme papain, chemo papain, glutamine cyclotransferase, chymopapain A, B, C, peptidase A and B, lysosome.

B. NUTRITIONAL VALUE OF *CARICA PAPAYA*

The Nutritional value of ***Carica papaya*** is rich in iron and calcium which is a good source of vitamins A, B and a vitamin C (ascorbic acid). It is the pack of Enzymes. It also contains terpenoids, alkaloids, flavonoids, carbohydrates, glycosides, saponins, and steroids, Enzyme Papain, chymopapain, Carotenoids B carotene, Crytoxanthin, Monoterpenoids Linalool, 4-terpinol, Alkaloids Carpaine, Carpinine, Vitamin C and B, Glucosinolates Benzyl isothiocyanate, papaya oil, Flavonoids Myricetin, kaempferol, Alkaloids Carpaine, Carpinine. ***Carica Papaya*** is a powerhouse of nutrients are help to improve cardiovascular system, protect against heart diseases, heart attacks, strokes and prevent colon cancer.

C. MEDICINAL VALUES OF EACH PART OF THE CARICA PAPAYA

LEAVES

Young leaves of **Carica papaya** are abundant of flavonoids (kaempferol and myricetin), Vitamin E, alkaloids (carpaine, pseudocarpaine, dehydrocarpaine I and II), phenolic compounds (ferulic acid, caffeic acid, chlorogenic acid), the cyanogenetic compounds (benzylglucosinolate) found in leaves. ***Carica papaya*** also contain carotenoids namely β- carotene, lycopene, anthraquinones glycoside. These all exhibit the medicinal Properties like anti-inflammatory hypoglycemic, anti-fertility, abortifacient, hepatoprotective, wound healing. Its Leaves are used in acne medicine, increases appetite, ease menstrual pain, Meat tenderizer, Relieve nausea.

FRUITS

Carica Papaya fruit is a rich source of nutrients such as provitamin A carotenoids, vitamin C, B, lycopene, dietary minerals and dietary fibre. It is used to relieve gum disease, toothache and mouth ulcer. In the morning, by consumption of ripe papaya, we can cure indigestion, constipation, flatulence and appetite. The fruit helpful in contracting the uterus muscles, which eases the painful flow during that time of the month. Additionally, it is rich in carotene, helps in regulating the hormone estrogen in the body, thereby inducing regular periods.

SEEDS

Carica Papaya seeds contain antibacterial properties, are effective against E. coli, Salmonella and Staphylococcus infections. Papaya seeds help to protect the kidneys from toxin induced kidney failure. Seeds can eliminate intestinal parasites, and help to detoxify the liver, Cure piles, typhoid, anti-helminthic and anti-amoebic properties.

LATEX

Carica papaya latex contains enzymes papain and chymopapain, cysteine endopeptidases, chitinases and an inhibitor of serine protease. Unripe papaya latex contains papain, chymopapain is used to treat commercial beer, as a meat tenderizer, lower inflammation and improve healing from burns and in the production of chewing gums. Cosmetically it is used in Shampoos. In human's papain reduces blood pressure. It is also used in Anthelmintic, relives dyspepsia and cures diarrhea, pain of burns and topically use, bleeding hemorrhoids, stomachic, whooping cough.

ROOTS

Carica papaya roots is used in urinary troubles. A decoction of the roots of this tree in the cure of dyspepsia.

JUICES

The milky juice is extracted from ***Carica papaya*** used as chewing gum for digestive problems, toothpaste and meat tenderizers. It contains papain and chymopapain used in digestive problems and in treatment of arthritis.

LEAVES EXTRACT

Carica papaya leaf extract containing Vitamin E which plays important activity in inhibition of cancer cell growth. It induces the production Th1-type cytokines. these cytokines help to control the immune system. Additional benefits of papaya leaves in menstrual pain.

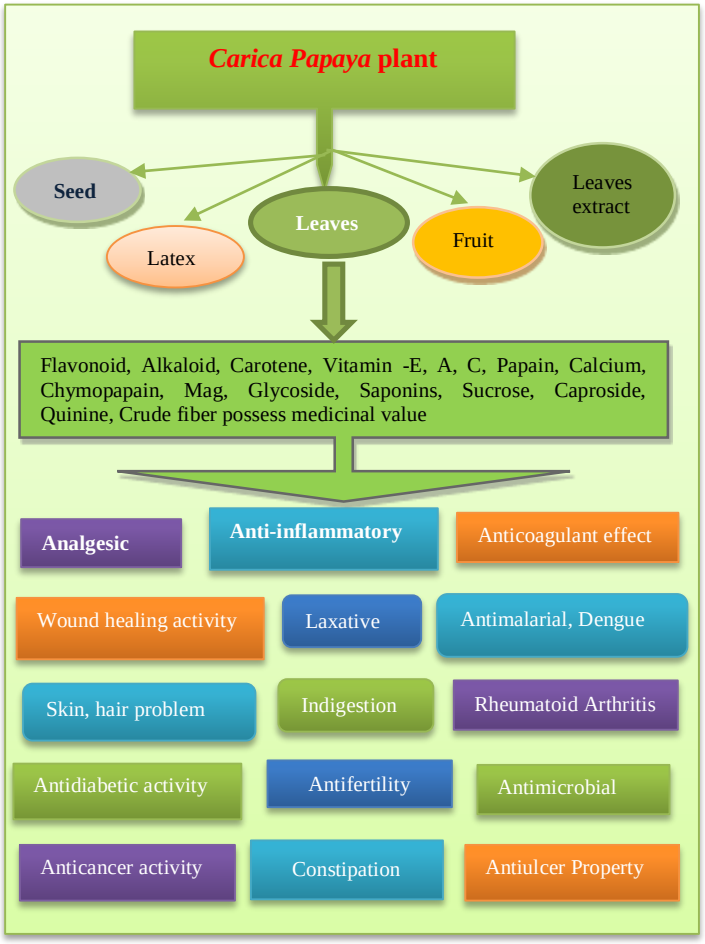


Fig. 5: *Carica papaya* plant exhibit medicinal value.

D) OTHER MEDICINAL VALUE OF *CARICA PAPAYA*

The different part of the ***Carica papaya*** plant containing leaves, seeds, latex and fruit exhibited medicinal, therapeutic values in many diseases.

1) Dengue fever

Carica Papaya leaf juice used in a dengue fever, which increases white blood cells and platelets, normalizes clotting.

2) Anti-malarial and Antiplasmodial Activity

Carica Papaya leaves tea are used in a treatment for malaria.

3) Rheumatoid Arthritis

Carica Papaya is a rich source of vitamin C which provide protection against rheumatoid arthritis.

4) Sunscreen and Soothing slave

Carica Papaya containing vitamin A which helps to restore and rebuild damaged skin. papaya peel is used as skin lightening agent, which apply with honey, the skin becomes smooth and moisturize.

5) Laxative

Ripe fruit of ***Carica papaya*** is laxative which assures of regular bowel movement.

6) Indigestion

Carica Papaya plant contains an enzyme known as "papain", which are used in the preparation of different remedies for indigestion.

7) Wound Healing Activity

Carica papaya extract increases the wound healing property that is important component for treatment of wounds.

8) Anti-inflammatory Activity

Carica Papaya leaves contains various nutrients and plant compounds with anti-inflammatory property such as papain, flavonoids, and vitamin E. Papaya leaf preparation useful in internal and external inflammatory conditions, including skin rashes, muscle aches, and joint pain.

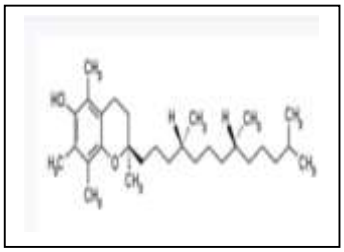
9) Antimicrobial Activity

Carica Papaya Plants shows antimicrobial activity because of the presence of bioactive compounds like glycosides, saponins, flavonoids and alkaloids.

MECHANISM ACTION OF CARICA PAPAYA IN DYSMENORRHEA

VITAMIN E

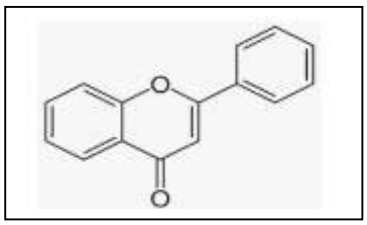
***Carica Papaya* leaves** is rich source of vitamin E which help to relieve menstrual pain by inhibition of prostaglandin biosynthesis. Vitamin E inhibit post-translational activation which reduce prostaglandin production. Vitamin E increases the production of vasodilator prostacyclin, prostaglandin E2 (PGE2), phospholipase A2 and arachidonic acid release, but suppress the COX post translational activity. In brief, vitamin E and its analogues inhibit phospholipase A2 and COX activities to inhibit prostaglandin production but promote vasodilator and uterine muscle relaxing prostanoids such as prostacyclin.



Vitamin E

FLAVONOIDS

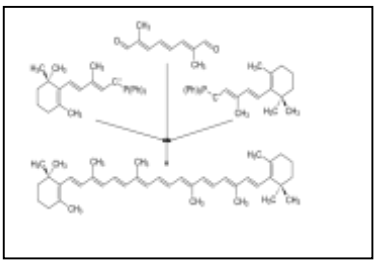
Flavonoids are important constituent present abundant in ***Carica papaya*** leaves having anti-inflammatory activity that can inhibit the enzyme cyclooxygenase-I that affect the intensity of menstrual pain. Flavonoids act as antioxidant agent. It helps to control the cellular activity and fight off free radicals that causes oxidative stress in body. Flavonoid block the enzyme cyclooxygenase I, that is the first phase of pain mediation synthesis such as prostaglandin that affects the decrease in the intensity of menstrual pain. Flavonoid blocks cyclooxygenase I (COX I) which has a role in prostaglandin biosynthesis as pain formation mediator, so that it will blocks the pain occur in menstruation.



Flavonoid

CAROTENE

present in the part of the fruit of the plant. Carotene helps in regulating the hormone estrogen in the body, thereby inducing regular periods. The fruit helpful in contracting the uterus muscles, which eases the painful flow during that time of the month.



Carotene

PAPAIN AND CHYMOPAPAIN

Papain and chymopapain present in the leaves of the ***Carica papaya*** has analgesic activity.

CALCIUM AND VITAMIN- C

papaya leaves contain Calcium and Vitamin -C which can affect contractility and relax the uterine smooth muscles to the enzyme activity of phospholipase-A and cyclooxygenase by inhibiting of cyclooxygenase.

MAGNESIUM

Papaya fruit contain magnesium which has a direct effect on blood vessel pressure and regulates the entry of calcium into smooth muscle cells, so it affects contractility, tension and relaxation of smooth muscle of the uterus.

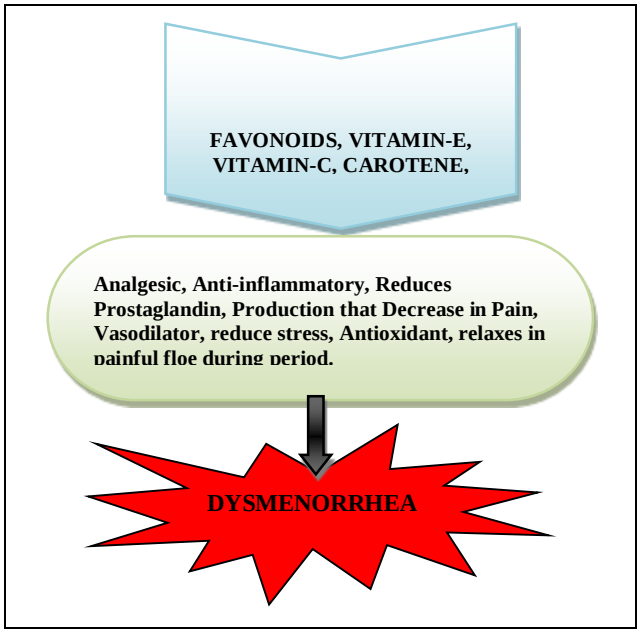


Fig. 6: *Carica papaya* in Dysmenorrhea.

FUTURE ASPECT OF *CARICA PAPAYA*

Traditionally, ***Carica papaya*** has been used for human betterment for a very long time. The part of the ***Carica papaya*** containing Leaves, Leaves extract, fruit, seeds and latex etc. are rich in a wide variety of Nutritional, Medicinal and Pharmacological values present in varying concentrations that makes-up the utility. These parts of plant possess antioxidant, chemoprotective, analgesic, anti-inflammatory and anti-infective properties that link to numerous human biological functions and allows to maintain the well-being of women body and retrieve of many disorders.

- ***Carica papaya*** is a naturally available, effective and safe product with rich sources of vitamins which provide pharmacological improvement/development in human and animals.
- It is proved that Papaya possesses nutritional as well as medicinal properties and its consumption and utilisation is beneficial to boost immunity against various diseases.
- Globally, there is an increase in demand of cosmetics, cosmetic industry use of ***Carica papaya*** in formulation of cosmetics. Because papaya is rich in Vitamin A, B and C, Minerals, Amino acids, fruit enzymes and Antioxidant. Papaya is used as a tonic in shampoo and conditioner also in facial moisturizer products for its anti-aging properties and it can be used to exfoliate and brighten skin.
- Papaya is abundant source of antioxidants, minerals that can be used in both moisturizing and boosting elasticity in skin and hair.
- In the future, ***Carica Papaya*** has been used to treat the Abortifacient, Amebicide, Asthma and respiration, Cancer, Corns and Bile, Dengue fever, Digestive purpose, Dyspepsia, Wound healing, Anticoagulant and Rheumatoid arthritis due to presence of flavonoids, alkaloids, glycosides, vitamins A, B, C and various enzymes.
- It Enhance body's immunity; Papaya leaves contain phenolic compounds, papain and alkaloids. These nutrients act as strong antioxidants which, enhances the body's immunity.
- ***Carica papaya*** contains an enzyme known as papain which is helpful to improve Digestive function and used for indigestion and promote the lung health as a natural medicine.
- Many research's has found that, by consuming ***Carica papaya*** at least once per week, might reduce the chance of getting a persistent HPV infection as compared to those never eating papaya fruit.
- In future ***Carica Papaya*** can be used to treat a sexually transmitted infection that can lead to genital warts or cancer (human papillomavirus or HPV). Carica papaya has a Antifertility property which may use to reduce fertility problems.

Fig. 7: various wide range of pharmaceutical product of *Carica papaya* available in market

It is observed in **Fig. 7**, there are various types of pharmaceutical products are including tablets, syrups, powders, face wash, ointments, shampoo and other dosage form containing ***Carica Papaya*** available in market at wide range and various researcher work on Carica papaya and its various parts which containing rich source of potential active substances useful for health and boost immunity of body in various diseases.

CONCLUSION

The ongoing review is about Menstrual pain that can be overcome by using natural herbal plant that is papaya (***Carica papaya linn***). The general mechanism of the different parts of ***Carica papaya*** including Leaves, Extract, Fruit, Seeds and Latex which cure the menstrual pain by inhibiting prostaglandin level and cyclo-oxygenase (cox-2). It also helps in contracting the uterus muscles, which eases the painful flow during that time of the month. It can be used as a safe and effective herbal medicine for primary dysmenorrhoea therefore it is advisable to adolescent females to consume ***Carica Papaya*** in painful days. The medicinal qualities and values of ***Carica Papaya*** can be enriched for medicinal purpose by investing wealth and time to draw out its value in future.

REFERENCES

[1] A. K. Srivastava1, V. K. Singh; "Carica Papaya- A Herbal Medicine; International Journal of Reseudies in Biosciences (IJRSB)" Volume 4, Issue 11, November 2016, PP 19-25.

[2] Vijay Yogiraj, Pradeep Kumar Goyal, Chetan Singh Chauhan, Anju Goyal, Bhupendra Vyas, *Carica papaya* Linn: An Overview; International Journal of Herbal Medicine 2014; 2 (5): 01-08

[3] Aravind. G, Debjit Bhowmik, Duraive S, Harish. G, Traditional and Medicinal Uses of *Carica papaya* , Journal of Medicinal Plants Studies; Vol. 1 No. 1 2013 www.plantsjournal.com Page | 7

[4] M. C. Gunde*1, 2, N. D. Amnerkar3, Nutritional, medicinal and pharmacological properties of papaya (*Carica papaya* linn.): A review; Journal of Innovations in Pharmaceuticals and Biological Sciences, www.jipbs.com

[5] A. Nugroho1*, H. Heryani1, Jae Sue Choi2, Hee-Juhn Park3 Identification and quantification of flavonoids in Carica papaya leaf and peroxynitrites cavenging Activity, Asian Pac J Trop Biomed 2017; 7(3): 208–213.

[6] Anitha B2, Raghu N1, Gopenath TS3, Karthikeyan M4, Gnanasekaran A4, Chandrashekrappa GK5 and Basalingappa KM1* Medicinal Uses of Carica Papaya, Journal of Natural & Ayurvedic Medicine, ISSN: 2578-4986

[7] N. Sudhakar*, Theivanai @ V. Rm. Potential Medicinal Properties Of *Carica Papaya* Linn. - A Mini Review; International Journal of Pharmacy and Pharmaceutical Sciences,ISSN- 0975-1491 Vol 6, Issue 2, 2014

[8] Siska Nurul Abidah1*, Soeharyo Hadisaputro1, Runjati2, Syarief Thaufik Hidayat3, Ari Suwondo4, Donny Kristanto Mulyantoro1 Effect Of *Carica Papaya L* Leaf On Menstrual Pain And Prostaglandin Level In Adolescent With Primary Dysmenorrhea: A True Experiment

[9] *Abidah SN, et al. Belitung Nursing Journal. 2017 June;3(3):198-204*P.

[10] Hasimuna*, Suwendara, G.I. Ernasaria, Analgetic Activity of Papaya (*Carica papaya* L.) Leaves Extract; International Seminar on Natural Product Medicines, ISNPM 2012

[11] www.scincedirect.com

[12] www.wikipedia.com

[13] www.pubmed.com

[14] www.researchgate.net

[15] www.google.com

[16] www.google.com

[17] S. Charu, R. Amita, R. Sujoy, G. Aneesh Thomas, 'Menstrual characteristics' and 'Prevalence and Effect of Dysmenorrhea' on Quality of Life of medical students; International Journal of Collaborative Research on Internal Medicine & Public Health; Vol. 4 No. 4 (April 2012)

[18] R. Monti1, C. A. Basilio1, H. C. Trevisan2 and J. Contiero2 *; Purification of Papain from Fresh Latex of *Carica papaya*; *Brazilian Archives of Biology and Technology*, © Paraná Institute of Technology Publication, *v.43, n.5, p. 501-507, 2000*

[19] V. D. Sanctis1, MD, A. Soliman2, MD, S. Bernasconi3, MD, L. Bianchin4, MD, G. Bona5, MD, M. Bozzola6, MD, F. Buzi7, MD, C. De Sanctis8, MD, G. T. 9, MD, F. Rigon10, MD, E. Perissinotto11, Sc 'Primary Dysmenorrhea in Adolescents: Prevalence, Impact and Recent Knowledge' Pediatric Endocrinology Reviews (PER) n Volume 13 n No 2 n December 2015

[20] V. Rajalaxmi1*, Jibi Paul1, V. Vijayapriya1, R. Helen Gracy2, K.Kamatchi1; Prevalence of dysmenorrhea among school & college girls and postpartum women; Drug Invention Today | Vol 10 • Issue 5 • 2018

[21] S. Shubham1*, R. Mishra2, N. Gautam3, M. Nepal1, N. Kashyap4 and K. Dutta5; Phytochemical Analysis of Papaya Leaf Extract: Screening Test; *EC Dental Science* 18.3 (2019): 485-490.

[22] Saurabh Pandey, Peter J. Cabot, P. Nicholas Shaw & Amitha K; Anti-inflammatory and immunomodulatory properties of *Carica papaya;* Journal Of Immunotoxicology, 2016. VOL. 13, NO. 4, 590–602

[23] Ario Imandiri1, Rohimatul Faizah1, Rakhmawati2; Acupuncture and Papaya Leaf Powder (*Carica Papaya* L) to Treat Dysmenorrhea; Malaysian Journal of Medicine and Health Sciences (eISSN 2636-9346), 32-39, Sep-2019

[24] K. Chattopadhyay, B. Raj, A. House, Mechanism of Action and Phytochemicals of Some Potential A nalgesic Agents from Indian Natural : A Review, International Journal of Pharmaceutical Science Invention, www.ijpsi.org ,7 ,ssue 4, April 2018.01-05

[25] Dysmenorrhea- Maryland State Family Planning Program Clinical Guidelines,Review, 09/01/11, 1-3

[26] Dysmenorrhoea: Painful Perioad; The American College of Obestetricians and Gynecologists.

[27] Linda French, M. D., Michigan State University College of Human Medicine, East Lansing, Michigan; Dysmenorhhea; American family physician; January 15, 2005, vol 71, no.02

[28] A.M Danborno1,2, S.H. Ibrahim2 And M. J. Mallo1; The Anti-Inflammatory and Analgesic Effects Of the Aqueous Leaves Extract of *Carica Papaya* ; *IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS) e-ISSN:2278-3008, p-ISSN:2319-7676. Volume 13, Issue 3 Ver. IV (May. – June. 2018), PP 60-63*

[29] Asha Roshan*1 , Navneet Kumar Verma2 , Anubha Gupta2, A Brief Study on Carica Papaya- A Review; Review Article International Journal of Current Trends in Pharmaceutical Research, IJCTPR, 2014, Vol. 2(4): 541-550.

[30] http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=d374

[31] http://www.plantsjournal.com/archives/?year=2013&vol=1&issue=1&part=A&ArticleId=5&gv=true

[32] Safety Assessment of Carica papaya (Papaya)-Derived Ingredients as Used in Cosmetics

[33] https://www.herzindagi.com/diet-nutrition/dont-throw-away-papaya-seeds-consume-them-right-way-control-cholesterol-ease-menstrual-pain-article-158241

[34] Dave Heena1,* and Trivedi Sunil, review artcle, Carica papaya: Potential Implications in Human Health, Current Traditional Medicine, 2019, Vol. 5, No. 4

[35] https://www.semanticscholar.org/paper/EFFECT-OF-CARICAPAPAYA-L-LEAF-ON-MENSTRUAL-PAIN-IN-Abidah Hadisaputro/97cf85ff37ea5289582b695cf32c2fd295825eba

[36] https://www.webmd.com/vitamins/ai/ingredientmono-488/n papaya

[37] https://www.google.com/search?q=papaya+biotique+scrub&hl=en&source=lnms&tbm=isch&sa=X&ved=2ahUKEwi3jKmv9vrAhUz7XMBHaCtCdcQ_AUoAXoECBcQAw&biw=1280&bih=570&

[38] https://www.news-medical.net/health/Papaya-Leaf-Extract-and-Platelet-Count.aspx

[39] Akshani Anjula Wijesooriya, Srianthie A. Deraniyagala and Chamari M. Hettiarachchi*

[40] https://www.researchgate.net/publication/307904829_A_Brief_Study_on_Carica_Papaya_A_Review/link/57d1283608ae601b39a19969/download

[41] google.com/search?q=carica+papaya+leaf+extract+syrup&sxsrf=ALeKk02TXvqdcLURfW7ZuYeZTZNSBaF5Q:1599663073150&source=lnms&tbm=isch&sa=X&ved=2ahUKEwic3fCpqdzrAhU-63MBHdbABX4Q_AUoAn

[42] https://biomedpharmajournal.org/vol12no2/antioxidant-anti-inflammatory-and-antibacterial-activities-of-the-seeds-of-a-sri-lankan-variety-of-carica-papaya

[43] Yusoff M. Dawood, MB ChB, MMed, MD, 'Dysmenorrhea', The Global Liabary of Woman Medicines, June-2008.

[44] S. Lacovides, I. Avidon, F. C. Baker, ' What we know about primary dysmenorrhea today: a critica review', *Human Reproduction Update*, Volume 21, Issue 6, November/December 2015, Pages 762–778, https://doi.org/10.1093/humupd/dmv039

AUTHOR

Author – Ms. Priyanka S. Sawarkar, M. Pharm (Pharmaceutics), Rashtrasant Tukdoji Maharaj University, Nagpur and email: priyankasawarkar05@gmail.com.