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An Overview on The Use of Galactogogues in the Breast-Feeding Mother

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Abstract: ***Breastfeeding mothers are often concerned about an inadequate quality of breast milk. The importance of Breastfeeding has been acknowledged by Indians since antiquity and recognized importance of certain medical plants for augmentation of Breast milk. Breastfeeding is the best nutrition for infants. Most of the mothers face the problem of insufficient breast milk which affects the health and well-being of Infant. Galactogogues are defined simply as substances that promote lactation. Oral galactagogues are substances that stimulate milk production. They may be pharmacological or non pharmacological (natural). Natural galactagogues are usually botanical or other food agents, such as moringa leaves, oats, shatavari roots, fenugreek, fennel etc. Pharmacological galactagogues such as domperidone, metoclopramide, sulpiride and Thyrotrophin releasing hormone (TRH). There are several beliefs and taboos on the Use of these galactogogues. Pre-lacteal feeding are those feeds which are given in the form of fluid or semisolid food to the infants at first three days after birth before putting infant on breastfeeding. Breastfeeding practices help the mother in understanding initiation, duration and problems encountered during breastfeeding. Maternal knowledge on breastfeeding practices, an exclusive breastfeeding has been positive health outcomes in the prevention of many chronic diseases in both infant and mother. There are several formulated products available in the market to increase the breast milk. In this review article topics like types of galactagogues, Beliefs and taboos, types of Pre-lacteal feeds, breastfeeding practices, maternal knowledge on breastfeeding and development of products to increase milk production are discussed.***

Keywords: Breast milk, galactagogues, metoclopramide, domperidone, breastfeeding.

I. INTRODUCTION

Breast milk is consider the optimal food source of newborns through one year of age. Many factor influence overall maternal production, including maternal pain, illness, balance of time when returning to work, anxiety or emotional stress. Although a variety of herbal and pharmaceutical options have anecdotal evidence of their ability to improve breast milk production, peer-reviwed studies providing their efficacy are lacking [1]. Signifying the ancient Sanskrit saying “matureva pibyatstanynam”(recommending breast feeding as the first choice) nature has provided all the vital requirement of an infant in the form of breast milk, which is universally recoignised nutritionally and immunologically superior than any other substitutes [2]. There are several advantages of breast feeding to the infants. It provides proper nutrition, complies fat demand of the baby, lactose and protein content and other vitamins and minerals etc. Breast milk has also a protective role against infections, apart from this nursing provides benefit to the mother too. Such as: It lowers the risk of the long term osteoporosis and premenopausal breast cancer and inhibits ovulation, in that way the exerting contraceptive effect and fastens the return to pre-partum state. For the proper nourishment of her baby the significant changes occur in the body of women during pregnancy and lactation period [3].

Fenugreek, metoclapramide, oxytocin and milk thistle have shown mixed results in improving milk production. However, the trails were small and had a variety of limitation [1]. Certain kinds of traditional galactagogues and proteins are associated with human volume. However, studies related to the active ingredients in these galactagogues are required to secure a recommendation about the use of traditional galactagogues among breastfeeding mothers [4]. Exclusive breast feeding involves feeding only breast milk without any added fluids or solids. It is highly recommended by he World Health Organization (WHO) for the first six months of life with supplemental breast feeding continuing for at least two years. [5] Breast milk is considered to be an ideal and the optimal food source for newborns through one year of age [6], It contains everything the baby needs for the first six months of life. The composition of breast milk changes even according to the baby’s changing needs as change in growth [7].

Breastfeeding promotes healthy weight gain and helps to prevent childhood obesity. Lactation failure due to inadequate breast feeding or the insufficient breast milk production can cause several problems in the initial days of life.

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The mortality and morbidity risks of the infants who receive other nutrition are four times more than infants who are breast fed [8]. According to the World Health Organization(WHO) and UNICEF 1.5 million babies die every year because they were not breast fed properly. Many more millions of babies are suffering from infectious diseases and malnutrition, never reaching their full potential because they were bottle-fed [8][9]. Breastfeeding is considered the most important source of nutrition in the first year of life for both the term and preterm infants because of its well known positive effects on short and long term outcomes [10].

II. SCIENTIFIC AND MEDICAL DESCRIPTION OF GALACTAGOGUES

Galactagogues are synthetic or the plants molecules used to induce and increase the milk production [11], which mediate complex processes involving the interaction between the physical and physiological factors. Among these, the most important factors are hormones such as prolactin (PRL). However, somatotropine, insulin, cortisol, estrogen, progesterone, medroxyprogesterone, leptin, oxytocin, recombinant bovine somatotropin (rBST) and thyrotropin releasing hormone(TRH) these are also plays an important role as galactagogues [12]. Galactogogues are substances that aid the initiation and the maintenance of the milk supply at a level which meets the needs of the baby. The production of the milk is controlled by the hormone prolactin. Nipple stimulation which controls the release of prolactin whilst oxytocin controls the release of the milk [13]. Breastfeeding is influenced by nutritional and non nutritional factors which are associated with endocrinology, climate, health and management that affects the milk synthesis and milk secretion. These are the factors modulate physiological actions that regulate situations such as non infections agalactias and hypogalactias,these are the latest being the main problem of breastfeeding women [12].

III. TYPES OF GALACTAGOGUES

Oral galactagogues are those substances that stimulates milk production. They may be pharmacological or non pharmacological (natural). The natural galactagogues are usually botanical or the other food agents. The choice between pharmalogical or natural galactagogues is often influenced by familiarity and local customs. Evidence for the possible benefits and harms of the galactagogues is important for making an informed decision on their use [14]. In ayurvedic medicine, the roots and leaves of *Asparagus racemosus*, also known as the shatavari, are used as hepato protectant, immunodulators and galactagogues. There is a currently no proposed mechanism of the action for shatavari's use as galactagogues [15].

Summarize the hypothesized mechanism of action and the potential adverse effects of some of the commonly used natural oral galactagogues is listed below in Table 1.

Table 1: Natural galactagogues with botanical name and there advantages and disadvantages [14], [16], [17], [18], [19]

Natural oral galactagogues	Botanical part	Advantages	Disadvantages
Alfafa (*medicago sativa)*	Leaf	Phytoestrogens might stimulate prolactin, mammary tissues. Provides nutrients essential to milk production.	Loose stools, may be allergenic for certain individuals, seeds may increase risk of sun burn.
Anise or aniseed (*Pimpella anisum)*	Fruit*	Contains trans-anethole, considered weakly oestrogenic, the aromatic compound in anise might act as adopamine receptor antagonist.	Possible allergen for some individuals
Barley (*Hordeum vulgare)*	Grain	The polysaccharide stimulates prolactin.	None known. Commonly consumed grain, also used to make brew.
Banana flower(*Musax paradisiaca)*	Blossom	Increased prolactin levels in rats.	None known. Commonly Consumed food in Asia.
Blackseed or cumin (*Nigella sativa)*	Seed	Stimulated mammary gland proliferation in rats.	Possible allergic contact dermatitis with oil.
Caraway (*Carum carvi)*	Fruit*	Reputedly oestrogenic.	Possible allergen for certain individuals.
Blessed thistle (*Cnicus benedictus)*	Aerial parts	Reputedly stimulates the flow of blood to the mammary glands.	Possible allergen for certain individuals.

Chasteberry (*Vitex agnus-castus)*	Berry	In historically used dosages, appears to stimulate prolactin	Diarrhoea, heart burn, itching, rash, flatulence, large doses suppressed prolactin in men and the impact on women unknowns.
Chickpea (*Cicer arietinum)*	Seed	Oestrogenic isoflavones might stimulate prolactin secretion.	None known, common food
Coriander (*Coriandrum sativum)*	Fruit*	Unknown.	Allergic reactions, photosensitivity, contact dermatitis.
Cumin (*Cuminum cyminum)*	Fruit*	Reputedly oestrogenic, stimulated mammary growth in rats.	None known.
Cotton seed or Levant cotton (*Gossypium herbaceum)*	Seed	Stimulated prolactin in animal studies. May assist the milk ejection reflex.	Hypokalaemia possible at high doses.
Date palm (Phoenix dactylifera or sylvestris)	Fruit	Increased prolactin in rats.	None known
Dandelion (*Taraxacum offcinale)*	Leaf, root	Unknown; reputed to stimulate mammary tissue: provides the essential nutrients.	Allergenic for certain individuals, diarrhoea, gastrointestinal upset (rare)
Dill *(Anethum gravelens)*	Fruit*	Oxytocin-like activity may improve milk ejection and milk removal, lightly stimulated mammary gland growth in an unpublished rat study, the contains linoleic acid and metabolites that are important to milk production.	None known
Fenugreek (*Trigonella foenum-graecum)*	Seed	Stimulated growth hormone in ruminants, might stimulates the milk production through dopamine receptor anatagonism. Phytoestrogens might also stimulate mammary growth. Oxytocic and anxiolytic properties might assist milk ejection reflex for better milk removal.	Digestive upset or loose stools (mother or infant), light headedness, lower blood sugar, maple smell in the urine and sweat, mild allergic reaction. Possible peanut allergen cross sensitivity.
Fennel (*Foeniculumvulgare)*	Fruit*	May stimulate prolactin indirectly via trans-anethole by decreasing the effect of dopamine receptors. Alternatively, oestrogenic properties may stimulate prolactin. Might also increase milk production indirectly by assisting the milk ejection reflex. Reputed stimulates mammary growth.	Photo sensitivity, atopic dermatitis, increased gastrointestinal motility. Essential oil may be toxic in large amounts.
Garden cress (*Lepidium sativium)*	Seed	Might assist milk ejection reflex. Stimulated prolactin and mammary growth in rats. Provides iron and protein, essential to lactation.	None known

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Ginger (*Zingiber offcinale)*	Rhizome	Unknown	None known
Goat's rue (*Galega officinailis)*	Aerial parts	Contains galegin, a precursor to menformin. Might exert effects via contents of steroids saponins. The reputedly stimulates mammary growth.	No data for humans. Minor abnormalities in blood and pathological specimens in rats.
Hops (*Humulus Iupulus)*	Strobilus	The oestrogenic, mammary stimulating, relaxing properties might assist the milk ejection reflex to improve milk removal.	Could worsen depression, contact allergy.
Ixbut (*Euphorbia lancifolia)*	Leaf	Euphorbia increased serum prolactin in animal studies.	Nausea and vomiting.
Jivanti (*Leptadenia reticulata)*	Whole plant	May assist milk ejection reflex	None Known.
Milk thistle (*Silybum marianum)*	Aerial parts, seeds	Appears to stimulate prolactin, possibly oestrogenic.	Nausea, flatulence, diarrhoea.
Moringa (*Moringa oleifera)* also known as drumstick, kelor leave or malunggay	Leaf	Increases prolactin; provides essential nutrients.	None known. Commonly consumed as a vegetable in the philippines and elsewhere.
Oats (*Avena sativa)*	Grain	Unknown, Reputed to stimulate mammary tissue.	None known, commonly consumed food.
Nettle or Stinging Nettle (Urtica dioica)	Leaf	Unknown. Provides thr essential nutrients.	Itching and dermatitis (contact with fresh herb), gastrointestinal upset, allergenic for certain individuals.
Papaya (green) (*Carica papaya)*	Fruit	Stimulated higher prolactin levels and mammary weight in rats.	Possible allergen for certa8n people.
Quinoa (*Chenoppodium quinoa)*	Grain	Unknown. Provides the essential nutrients.	None known, commonly consumed food.
Red Clover (*Trifolium pratense)*	Flower	Might stimulate prolactin via phytoestrogens.	Headache, nausea, rash.
Red Raspbery (*Rubus idaeus)*	Leaf	Oxytocin activity may assist the milk ejection reflex and breast emptying. Women who used the extract during pregnancy had a shorter time to lactogenesis.	Might have laxative effect.
Sesame (*Seaamum indicum)*	Seed	Stimulated mammary growth in rats.	None known, commonly consumed food
Shatavari (Asparagus racemosus)	Root	Oestrogenic might stimulate production by increasing prolactin. Increases weight of the mammary gland in animal studies.	Runny nose, itchy conjunctivitis, contact dermatitis and cough. Might have laxative effect.
Torbangun (*Coleus amboinicus lour)*	Leaf	Might stimulate proliferation of secretory mammary cells.	Hypoglycaemia and stimulation of the thyroid gland.
Vervain or Verbena (*Verbena officinailis)*	Aerial parts	Reputed oxytocin and anxiolytic properties may assist the milk ejection reflex and milk removal.	Unknown.

The oral pharmacological galactagogues are listed below in Table 2.

Table 2: Pharmacological galactagogues [17], [19], [20].

Oral pharmacological galactagogue.	Advantages	Disadvantages
Domperidone	Peripherally-acting dopamine, D2=receptor antagonist, increases prolactin release from the pituitary gland.	Headaches, somnolence, abdominal pain, might also cause weight gain. Increased risk of cardiac problems if history of prolonged QT interval, especially at the high doses.
Metoclopramide	Increases the prolactin levels by anti-dopaminergic effects.	Crosses the blood brain barrier; may cause restlessness, drowsiness, fatigue, depression and involuntary body movements
Sulpiride	Increases the prolactin levels by anti-dopaminergic effects.	Anti-psychotic medication; may cause headache, fatigue, weight gain, extrapyramidal effects.
Thyrotrophin realsing hormone (TRH)	Increases prolactin, likely via stimulation of calcium release which induces prolactin gene expression and release	Changes in blood pressure, headaches, nausea; could induce hyperthyroidism.

IV. BELIEFS AND TABOOS

Tradition is the act of handing down customs or beliefs from one generation to the next generation . These can be based either on fact, or on beliefs and practices arising from the community, family or even racial religious groups and where they relate to a person's well being or protection from harm or ill-health, they are mostly based on a significant reasoning that they are of benefits [21]. There are many types of taboos practiced around the world. The most common among those taboos relate to food and religious or also called as taboos [22].

Plants are used on many ways including worshipping Gods and Goddesses for the protection and betterment for human life [23]. In every human society the worship is performed with the traditional rituals for well-being. Many tribals communities preserve this tradition through folklore and worship their deities right from the occasion of birth to the mourning death. They perform the specific worship with preside offerings [24]. Some herbs and selected local vegetables were also a major lactogogue in this Ghanaian population. Their use was however, relatively low when compared to the other lactogogues types [25]. The most common herb used in the Brong- Anafo region was Abemudro (a polymerase formulation) mostly used to improve the lactation, the earlier study in the eastern region of Ghana also reported its usage [26].

In India various Gods and Goddesses are worshipped in the different religious throughout the country. Various plant parts like twigs, bark, flowers, leaves, fruits and seeds are offered to Gods. There are many other plants grown near the different religious institutions and they are regarded as scared plants by different ethnic groups of the country [27]. They preserve all the plants by all means which are used in different rituals. At a time when ecological deforestation and degradation have been taking place at an alarming rate throughout the globe, in India thousands of pockets of the natural vegetation scattered throughout the country are preserved almost in pristine condition [28][29].

Plants have the special role in religious and social ceremonies of every rural society [30]. Tribal folklore are rich in the magical-religious beliefs and taboos. They believe that some Gods and deities resides on the tree in the forest. If they do not show the mark respect to them their full clan will be destroyed. So they preserve the plants which they regard sacred for cultural, social and religious purposes.

Their taboos, festivals, rituals and other cultural aspects are closely associated with the surrounding vegetation preserved on the religious ground [31]. All over the world the indigenous people have protected the biodiversity with which they have symbiotic relationship with the plants [32]. Women in traditional Indian society have been conditioned to zealously maintain and observe these taboos and ensure that the cultural norms, customs and traditions are passed on to the next generation of women. Women are principal actors in maintaining taboos, because it allows them to control the certain social interactions outside the household [33].

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V. TYPES OF PRE-LACTEAL FEEDS

Prelacteal feeds are the foods given to newborns before breastfeeding is established or before breast milk comes out, usually on the first day of life [34]. Although Pre-lacteal feeding is a barrier for implementation of the exclusive breastfeeding practices and increased the risk of neonatal illness and mortality, it is continued as a deep-rooted nutritional malpractice in the developing countries [35]. Exclusive breastfeeding is the feeding of an infant with only breast milk and no additional food, water, or other liquids given (with the exception of medicines and vitamins, if needed) during the first six months of life the infants who are exclusively breastfeed have less chance of becoming ill or dying from diarrhoea, ear infections pneumonia, meningitis and other infections [36]. Exclusive breastfeeding is the most widely known and the most effective intervention for preventing early-childhood deaths. 1.4 million deaths world wide among children under five every year, despite of this the prevalence of exclusive breastfeeding (EBF) in many of the developing countries including Ethiopian is low during the first six months of life [37].

Every day, three to four thousand infants died in the developing world from acute respiratory infections and diarrhoea. Even though pre lacteal feeding is not the direct cause of this death, but it is one of the contributing causes of death as comorbidity with diarrhoea and respiratory tract infections [38]. Pre-lacteal feeds increases the risk of allergies and illnesses, particularly if they are given before the baby has had colostrum. Pre-lacteal feeds affect stimulation of breast milk production suckling and mother and baby bonding [39]. Children who are exposed for pre-lacteal feeding before six months of age were 16 times more likely to develop pneumonia or diarrhoea [40]. Most of the mothers practice pre-lacteal feeding because they believe that, it gives laxative effect, clean meconium from the gut or has rehydration effect for newborns. But these prone the new born to contamination and diarrhoea [41]. Even though thecolostrum is there times richer in vitamin A and ten times richer in beta-carotene than mixture of milk, some believe pre lacteals are the necessary substitutes for colostrum [34][35].

Pre-lacteal feeding are those foods which are given in the form of fluid or semisolid food before breastfeeding to an infant during the first three days after birth [34]. Colostrum avoidance which includes the discarding and pumping colostrum during the first five days after birth [42]. Pre lacteal feeds should not be given but still the majority of mothers give either sugar water or honey first three days after birth. Discarding of the colostrum is still practiced widely. The colostrum is rich in vitamins, minerals, and immunoglobulins that protect the child from infections [32]. Discarding the colostrum and then feeding the child with sugar water, honey and ghee makes the child vulnerable to infections and diseases. Other studies have also found that similar practices in the community and it is very largely influenced by the relatives and the primary care provides during child birth [44].

VI. BREAST FEEDING PRACTICES

Breastfeeding is universal in India and several other cultural practices are associated with lactation and breastfeeding. Social practices related to lactation and breastfeeding in India primarily revolve around the concept of ritual purity and ‘hot and cold foods, food avoidance, restricts certain diet after childbirth and remaining in seclusion for a period of time due to the polluting effects of childbirth [45][46]. Breastfeeding is one of the most important determinants of child survival, birth spacing and prevention of childhood infections and diseases. In various studies the importance of breastfeeding has been emphasizing [47][48]. The importance of exclusive breastfeeding and the immunological and nutritional values of breast milk has been demonstrate in various aspects [49][50]. The beneficial effects of breastfeeding depend upon breastfeeding initiation, it is the duration and the age at which the breast fed child is weaned [51]. Breastfeeding practices vary among the different regions and the different communities. In India, breastfeeding in rural areas appears to be shaped by the beliefs of the community, which are further influenced by many other factors such as social, cultural and economic factors [48]. The child’s fundamental right is the breastfeeding. Exclusively breastfeeding (EBF) is used to define initiating breastfeeding immediately after the birth and not giving any other solid food (including water) to the infants [52]. Globally, an estimated 12% of mortality in children underthe age of five years is attributable to suboptimal breastfeeding practices [10]. Lactation is a complex physiological mechanism involving hormonal, physical and emotional factors. Inadequate breast milk production is among the key factors that increase the rate of suboptimal breastfeeding among the lactating mothers [53][54].

A. Initiation of Breastfeeding.

Before initiation of breastfeeding after birth is considerably delay in India and in most of the cases, the valuable colostrum is discarded before putting the child to the breast. Colostrum is regarded as the yellowish coloured fluid that is harmful to the child's health, hence it is not fed and discarded [55][56] whereas, current evidence shows that colostrum contains lactoferrin, lysozyme and immunoglobulins which may help reduce and protect against neonatal septicaemia, diarrhoea, and acute respiratory infections. More over, reducing infant mortality rates [57].

Women in rural areas have a very positive attitude towards initiation of the breastfeeding [58]. In this study, which show almost all the women had initiated breastfeeding and continued to breastfeed beyond 9 months after the birth. Other studies conducted in rural areas show that almost all the mothers initiate breast-feeding [59]. Urban areas in the other studies also show a similar pattern towards the initiation of breastfeeding [60]. The best time to initiate the breast milk should be initiated within 30 minutes of delivery. If it delay in initiation will lead to a delay in the development of oxytocin reflexes, which are very important for the concentration of the uterus and breast milk reflexes [61].

B. Duration of Breastfeeding.

Exclusive breastfeeding should be continued for at least 6months [48][49]. It protects the child from malnutrition, infections, diseases and helps the overall development of the child [49][50]. Only 40% of the mothers were doing the exclusive breastfeeding and the remaining 60% of the mothers were not. They prematurely introduces weaning the child, which may lead to the development of infections and may have long term effect on the physical growth of the child [62]. Postnatal check-ups were not attended by a majority of mothers. It may also have contributed toward the early weaning or late weaning practices. The Importance of the intervention in the form of teaching breastfeeding techniques had a positive outcome show in the previous studies [63]. Breastfeeding is one of the most effective ways to ensure child health and survival. Breast feed children perform better on intelligence tests as well as are less likely to be overweight or obese and less prone to diabetes later in life. Women who are breastfeed also have risk of breast and ovarian cancer [64].

C. Problems Encountered by Breastfeeding.

Breastfeeding is the feeding of an infant with breast milk directly from the female human breasts rather then a baby bottle or any other container [88] Breast milk promotes sensory and cognitive development and protects the infant against infection and other chronic disease [65]. Exclusive breastfeeding is internationally the preferred way of feeding infants during the first 6months of their lives and is recognized as being one of the most natural and best form of preventive medicine for the infants to protect from infections [66]. Early and exclusive breastfeeding is widely regarded as an important intervention that reduce neonatal, infant and child mortality and remains a basic for child survival other strategies. Breastfeeding is also associated with the improved maternal recovery post partum and reduced the incidence of diabetes and cancers [67]. Breastfeeding mothers face a lot of problems in their attempt to carry out the exclusive breastfeeding. Also one can see that the women have who has deficient knowledge about Exclusive breastfeeding [68]. This finding is significant in places where these animals are the only sources of available and affordable first class proteins of high biological values. This is also a problem in the country like Nigeria where the breastfeeding is an maternal option that involves a complex interaction of socio-economic, religious, psychological, cultural and many more [69]. Exclusive breastfeeding for first six months is important for health of both the mother as well as the growing infant. Infants who are not exclusively breast fed are more likely to develop the gastrointestinal infections the risk of mortality due to diarrhoea and other infections can increase in many fold in infants who are either partially breastfed or not breast fed at all [52].

D. Infant Feeding:- Breast Milk.

Breast milk was highly valued and considered to be un equalled by any other food with regard to its nutritional value of Infants. In the old ayurvedic beliefs anti dating Buddha, liken breast milk to the ‘sap of immortal life divine. These views have led to the belief that prolonged breastfeeding not only made the child strong but also that the longer the child was breastfed the longer would be its life span of the child [70]. The nursing period was considered as an important phase in the life of the mother as well as the infant. Great efforts were made during the ebbing periods of the lactation to increase and maintain the flow of milk. Garlic was regarded as a galactogogues and was extensively used in the mother. Garlic was also tied around the necks of the mother and the child. Fish and washing of the fish were also thought to be of great benefit during lactation [71].

VII. MATERNAL KNOWLEDGE ON BREASTFEEDING

Early exclusive breastfeeding has been linked to positive health outcomes such as the prevention of various chronic diseases for mother and child, the improvement of Infants immunity, neuro development, nutrient absorption and maternal psychological well-being [72]. Women might experience the difficulty with breastfeeding due to numerous biological, social and cultural factors [73]. Currently breastfeeding promotion interventions have not been advocate successful in addressing in sufficient milk supply [74], the most come reason that the women cite when they discontinue the breastfeeding [75]. In 2001 study, 30% of mothers reported as the major reason for discontinuation [76]. The majority of our study respondents resided in Southern areas of the US, a region where the breastfeeding rates are 20%-30% lower than the national average, both for initiation and the duration of breastfeeding [77].

Breastfeeding is also associated with reduced the risk of childhood infections, diseases, obesity and long-term benefits may include protection against the development of type-2 diabetes and other non communicable diseases [78]. Some studies also point to benefits in schooling years and performance [79][80]. Lactogogues are the substances which could be used to assist Initiation, augmentation or maintenance of the rate of maternal milk synthesis [81]. There are evidence base for pharmaceutical Lactogogues such as domperidone and metoclopramide [82], is stronger than it is for herbal and food-based preparations where the safety and concerns around insufficient study sizes have been raised [25].

VIII. DEVELOPMENT OF PRODUCTS TO INCREASE MILK PRODUCTION

Galactogogues are the substances or medications believed to stimulate initiation, maintenance and augmentation of maternal milk production [83][84]. Galactogogues act by increasing the prolactin secretion which in turn the milk production. They also work psychologically and have a marginal effect on the milk production. Suckling is the best Lactogogues exercise. Garlic is commonly used as the galactogogues food. Fenugreek (*Trigonella foenum-graceum)*, an herb from the pea family, is the most commonly used herbal galactogogues foods in the world wide [83][85]. While special herbs and food substances continue to be widely used in many settings around the world to enhance the breast milk for production for centuries, many evidence regarding their benefits or harms is largely absent [25].

A. Formulation of Galactogogues Mix.

Two variations of galactogogues mix were prepared with the following ingredients:

1) *Fenugreek- Galactogogues Mix:* Sprouted, dried and powdered Ragi flour (60gm), Oat meal (20gm), Fenugreek (20gm), Turmeric (200gm), Desiccated coconut powder(20gm), jaggery (20gm), water(200ml).
2) *Garlic- Galactogogues Mix:* Sprouted, dried and powdered Ragi flour (60gm), Oat meal (20gm), jaggery (20gm), Garlic (30gm), Turmeric (200gm), water(200ml), curds/buttermilk (100ml), salt (to taste), jeera powder (a little),Coriander leaves (a little), Desiccated coconut powder(20gm) [86].

B. The Development of the Galactagogues Product.

The product name called ‘Lacto Munchies’ is a product providing the variety of nutrients like energy, protein, calcium, iron and fibre. This product is mainly designed and developed for the nursing mothers to help them breastfeed their babies to the fullest and cancers consumed by all age groups (except pregnant women because as it contains flax seeds) due to its high nutritional value. The main objective for developing the product lacto munchies was to help the working mothers as well as the mother in nuclear family to be able to consume traditional and nutritional galactogogues for exclusive breastfeeding. The results of microbial analysis of the product to be safe for consumption for the period of one month and for improving the shelf life of the product addition of class-I preservatives may prove to be helpful [87].

IX. CONCLUSION

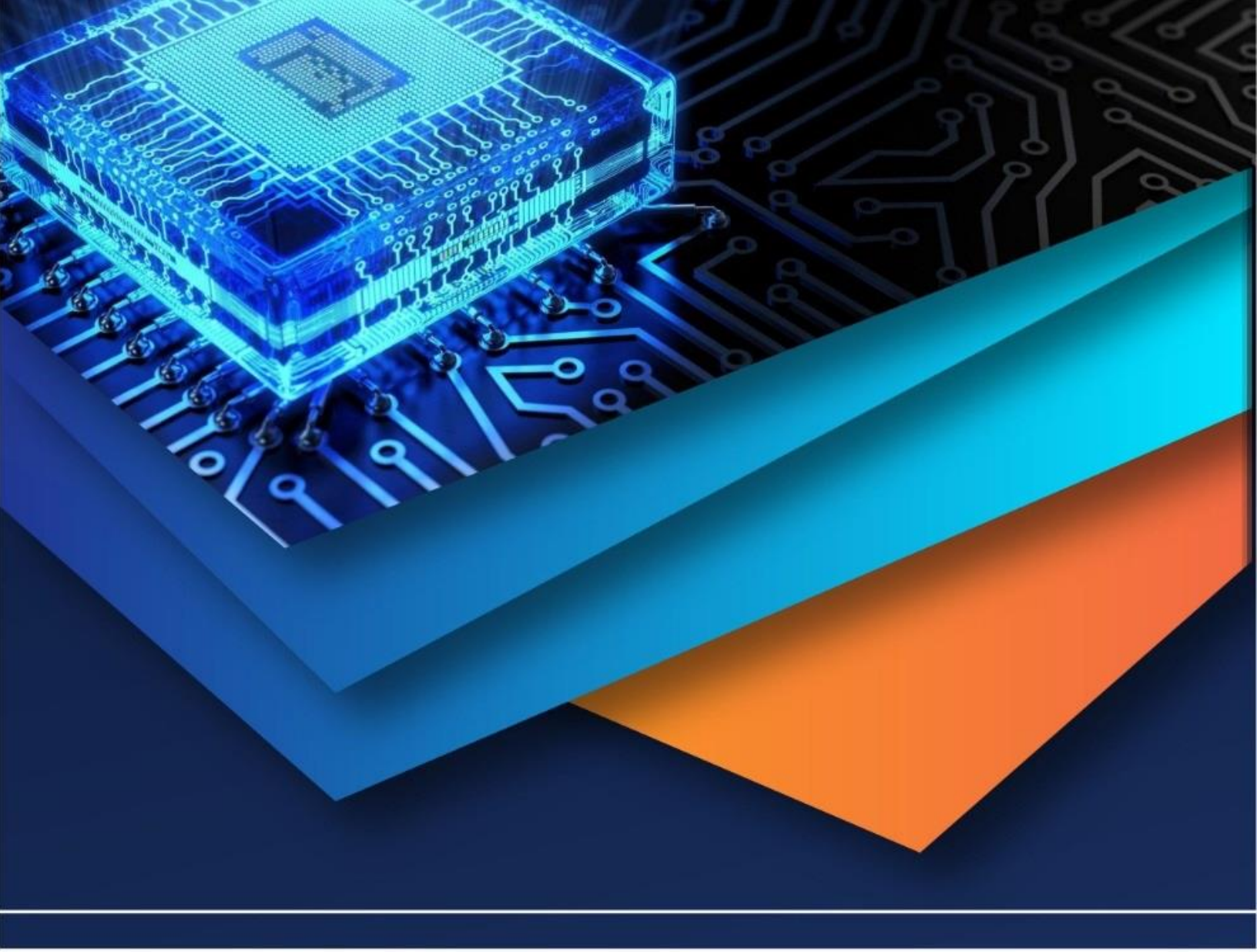
The importance of Breastfeeding has been acknowledged by Indians since antiquity and recognized importance of certain medical plants for augmentation of Breast milk. There are several beliefs and taboos on the use of these galactogogues and due to lack of evidence health providers face the challenge of recommending or prescribing galactagogues. Although anecdotal evidence encourages the use of oxytocin and domperidone are potentially available for compounding purposes and also the use of metoclopramide fenugreek, Asparagus and milk thistle furthered galactagogues properties, efficacy and safety data in the literature are lacking. Hence more studies are needed to evaluate the effects of available galactagogues on breast milk production formulated products available in the market should provide proper information and health benefits of use formulated galactagogues product.

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