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# Optimization of different forms and levels of herbs in quarg type cheese

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**Abstract**
Quarg type cheese was prepared by using of cow milk with optimized the various sutaible forms i.e. (paste, oil and extract) and levels of herbs included *Peppermint*, Tulsi and *Lemongrass* and the sensory evaluation of Quarg type cheese taken by the panel of five judges. On the basis of sensory evaluation the form was finalized for pre-experimental trials. Extract form was most suitable for fortification on the basis of sensory evolution. Because of in the oil form very intense flavor observed instead of very small utilization and in the paste form not get mix well and loss of main characteristics of the product. i.e. spreadability. So, extract form was finalized by the panel for further study. In Quarg type cheese herbs fortifications was tried in alone or in combination; on the basis of synergetic effect. Combinations get better result than alone, therefore all possible combinations were tried and best level of each combinations were selected for further study. The investigation was undertaken to explore the possibilities of utilizing various herbs in Quarg type cheese manufacture to improve the health benefits of product. The best combinations in Quarg type cheese i.e. 4 percent Tulsi and 6 percent *Peppermint* get novelty product which having fat, protein, reducing sugar, total solid, ash, acidity and pH was 10.93, 12.22, 2.24, 26.60, 1.20. 0.76 and 4.62, respectively.

**Keywords:** Peppermint, tulsi, lemongrass, quarg cheese

## Introduction
Quarg, or Speisequark in German, is a natural, unripened, fresh cheese that is manufactured in large quantities in Germany and is very popular there. It's essentially a milk protein paste made by acid coagulating milk with proper bacterial cultures (e.g. *Streptococcus cremoris and Leuconostoc citrovorum*) with addition of a small amount of rennet to help separate the protein coagulum from the whey and thus better yields. It comes in a variety of fat contents, ranging from almost fat-free to as much as 40% fat in the dry matter. This is a popular cheese in Central Europe (e.g. Germany, Poland and Austria). Kvarg, tvarog, tworog, twarog, Sauermilchquark, and Speisequark are some of the other names for this product in different countries (Gahane, 2008) [5]. Chakka and Shrikhand are the products related to quarg popular in India.

Herbs and spices are parts mostly leaves and seed of plants that are used for their taste, flavour and aroma imparting colour in food products and for medicinal and functional properties. This may be due to their properties are used as colorants, preservatives, or medicine. They are cultivated in temperate and tropical climate (UNIDO, 2005) [15]. The uses of herbs and spices have been known since long time, and the interest in the potential of herbs is remarkable due to the chemical compounds contained in herbs, such as phenyl propanoids, terpenes, flavonoids, nisin and anthocyanins (Jessica Elizabeth De La Torre Torres, 2017) [6]. Herbs have been used to strengthen foods as preservatives, flavorings, and therapeutic agents throughout history. Despite the fact that herbs are inexpensive, they have been valued as gold or jewels for centuries. Herbs and spices were used by the ancient Egyptians, and India and China have been using them for centuries. Herbs can now be utilized to improve the acceptability of foods as well as their health. According to a World Health Organization survey, 70–80 percent of the world's population depends on modern medicine, primarily herbal sources, for their primary healthcare (Chan, 2003) [2]. Furthermore, up to 60% of the world's population and 80% of the population in undeveloped countries are directly depends on herbs and plants for their medical benefits (Shrestha and Dhillon, 2003) [13].

Herbs have also been used as food additives all throughout the world, not only to improve food's organoleptic properties, but also to extend the shelf life by suppressing or preventing food borne pathogens (Lai and Roy, 2004) [7]. Several studies have suggested the use of dietary

herbs for their anti-mutagenic, anti-inflammatory, anti-oxidative, and immunological modulator properties, which have been shown to improve human health (Conn, 1995) [3]. Herbs can be used as good sources of antioxidants and salt substitutes, according to a dietary guideline (Tapsell *et al*., 2006) [14]. Herbs and spices are plants or parts of plants, mostly leaves, fruits and seeds that are used for their taste, flavor, aroma, and imparting color in food products, or for medicinal and functional properties.

**Herbs use in Quarg Type cheese**

Tulsi also called Basil, holy basil, clove basil or wild basil, and it is a valuable medicinal plant used since ancient times. It belongs to the family *lamiaceae*, has been mentioned in Charaka Samhita (NIIR Board, 2004) [10], an ancient Ayurveda text and marked by its strong aroma and astringent taste, it is regarded in Ayurveda as a kind of "elixir of life" and believed to promote longevity. It is an elixir for cough; the leaves when chewed after meals acts as a digestive agent. *Tulsi* prevent bacterial growth and used as a preservative. The leaves and flower of *Ocimum gratissimum* are traditionally used as *digestive*, carminative, aromatic, and galactagogue, stomachic and tonic agents. *Ocimum gratissimum* have been recommended for the treatment of diarrhea, fever, ophthalmic skin diseases and upper respiratory tract infections and for insect bite. It is also suggested as antimicrobial, antifungal, antibacterial, anti-malarial, antiviral, anesthetic, anti-protozoal and anthelmintic agents (Monga *et al*., 2017) [8].

Peppermint plants reach a height of around 2-3 feet. Opposite the white flowers are dark green, aromatic leaves. Peppermint is a plant that grows wild in moist, temperate climates and is native to Europe and Asia. The menthol-containing leaves and stems are used as medicine and food flavoring. Peppermint, common tea flavoring, can also help with digestion and relieve an upset stomach. It has a cooling and numbing effect and is often used to treat headaches, skin irritation, nausea, diarrhea, menstrual cramps, flatulence, and stress anxiety **(**Balakrishnan, 2015**)** [1]. Tulsi is another name for basil. This herb has been used for medicinal purposes since ancient times. The aqueous extract of *Ocimum sanctum* leaves reduced blood sugar levels significantly. Anti-asthmatic, anti-stress, antibacterial, anti-fungal, antiviral, anticancer, stomach anti-ulcer activity, antioxidant, anti-mutagenic, and immune stimulant properties were also found in this plant (Prakash and Gupta, 2005) [12].

Lemon grass (*Cymbopogon citratus L*.) is a perennial grass in the family *poaceae* grown for its fragrant leaves and stalks which are used as a flavoring agent. Lemon grass is also known as Gavatichaha in Marathi and is used as an addition to tea and in preparations such as kadha which is traditional herbal soup used against cough, colds, etc. It has medicinal properties and is used extensively in Ayurvedic medicine. It is supposed to help with relieving cough and normal congestion (Mule *et al*., 2018) [9]. Lemongrass is an economically important plant that has been used for centuries, as a medicine because of its wide-ranging therapeutic properties included relief of rheumatic and other pain and healing effect on ulcers (Fenwick *et al*., 1990) [4]. Flavonoids present in Lemongrass, licochalcone A and licochalcone B which have equal antioxidant activity of vitamin E, and glabrene which is 3 times as active when compared with vitamin E (Okuda *et al*., 1989) [11].

## Material and Methods

The experimental procedures adopted during the course of investigation are presented in this chapter.

**Materials required**

The following materials were used while performing the various experiments of present investigation.

**Cow Milk**

Milk sample of cow milk was obtained from Research-Cum Development Project on cattle, located at central campus, at Post Graduate Institute, M.P.K.V., Rahuri.

**Starter culture**

Cheese culture (NCDC-149) was procured from National Collection of Dairy Culture, Dairy Microbiology Division, NDRI, Karnal (Haryana).

**Rennet**

Microbial “Meito” rennet was purchased from CHR Hansen Ltd. Mumbai to make the firm and desirable Quarg type cheese.

**Muslin cloth**

The muslin cloth of 1x1m size (90 meshes) was used for draining of whey.

**Herbs**

Fresh leaf of herbs peppermint, tulsi and *Lemongrass* was obtained from Dhanvantari MPKV Rahuri.

**Cheese Knives**

MS Framed with nylon wire knife both of vertical and horizontal was used for cutting the curd.

**B.O.D. Incubator**

B.O.D. Incubator manufactured by M/S. Newtronic, Mumbai (India) was used for incubation.

**Weighing balance**

Electronic precision weighing balance (ET 2245, Sartorius ISO: 9001) was used for weighing samples, ingredients and chemicals etc.

**Laminar air flow**

Kirloskar electrodyne Ltd., Pune laminar air flow was used for transfer of culture and microbiological work.

**Autoclave**

An instrument manufactured by M.K. Oswal Laboratories Corporation, J.P. Industrial Corporation, Mumbai (India) was used for sterilization of glasswere’s.

**Refrigerator**

Samples were kept in refrigerator (Godrej Ltd., Mumbai) at 4± 1 °C for cooling.

**Methodology**

**Preparation of Quarg type cheese**

The quarg type cheese was prepared by using technology developed at NDRI for manufacturing of quarg cheese, prescribed by Gahane (2008) [5] with some minor modifications.

**Pasteurization of milk**

Standardized milk was heated to 85 ºC for 15 min and mixed thoroughly and cooled to 37 ºC.

**Inoculation**
The milk was inoculated by adding 1 percent starter culture (NCDC-149) and incubated at temperature 37 °C.

**Renneting**
Two and half hrs after the addition of starter culture, microbial rennet @ 200-300 mg/ 100 lit. milk was added and mixed thoroughly.

**Incubation**
The content was left undisturbed for curd setting in incubator at 37 °C, which took around 8-10 hrs starting from culturing.

**Cutting and Stirring**
The coagulum was then cut using knives and it was again left undisturbed for about 10-15 minutes.

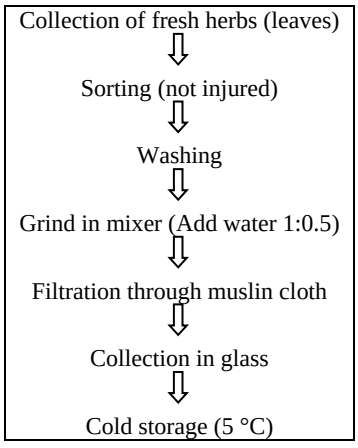
**Cooking/Heating**
The curd was heated slowly and gradually increasing temperature to 55-60 °C @ 1 °C per minute and curd hold for 10 minutes at 60 °C.

**Cooling and Whey off**
Cooked curd was then cooled to room temperature and filled in muslin cloth hanging for 3 to 4 hrs.

**Mixing**
The obtained Quarg type cheese was homogenized by mixing herbs thoroughly.

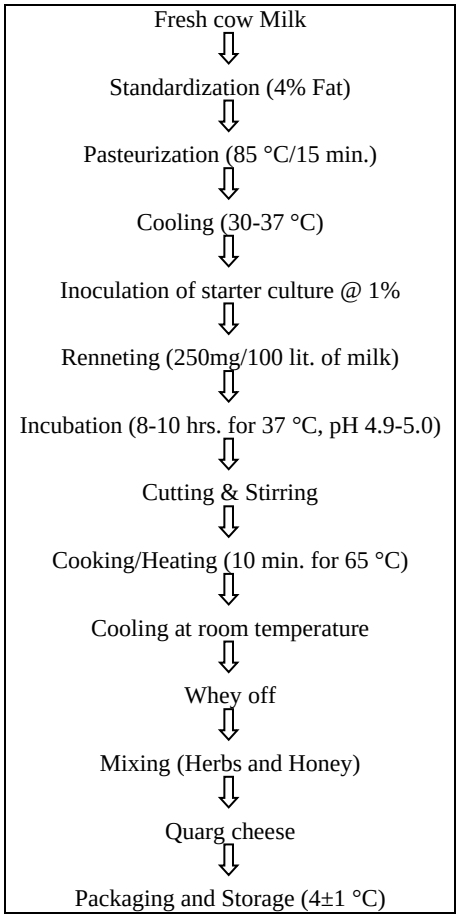
**Packaging and storage**
The Quarg type cheese prepared by using cow milk and stored in refrigerator at 4 ºC ± 1 ºC.

**Flow chart for preparation of herbs extracts**




Flow chart for preparation of herbs extracts

**Flow chart for manufacture of Quarg type cheese**




Flow chart for manufacture of Quarg type cheese (Gahane, 2008) [5]

**Procedure**
**Phase-I**
The beaker trials were conducted to finalize the form of herbs (Extract/Paste or Oil). The treatment details are as under. On the basis of sensory evaluation the form was finalized for pre-experimental trials.

Extract form of herbs

| Sr. No | Herbs extract | Percent of herbs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Peppermint | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 2. | Tulsi | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 3. | Lemongrass | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

Paste form of herbs

| Sr. No | Herbs paste | Percent of herbs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Peppermint | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 2. | Tulsi | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 3. | Lemongrass | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

Extract form of herbs

| Sr. No | Herbs oil | Percent of herbs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Peppermint | 0.005 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 |
| 2. | Tulsi | 0.005 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 |
| 3. | Lemongrass | 0.005 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 |

Peppermint, Tulsi and Lemongrass were tried in various forms (extract, oil and paste). Extract form was most suitable for fortification on the basis of sensory evolution. Because of in the oil form very intense flavor observed instead of very small utilization and in the paste form not mix well and loss of main characteristics of the product. i.e. spreadability. So, extract form was finalized by the panel for further study.

**Phase-II**

The beaker trials were conducted to finalize the levels of different herbs Extract. It was carried out for finalizing of different levels of herbs to be used in manufacturing of Quarg type cheese. The treatment details are as under. On the basis of sensory evaluation the levels was finalized for pre-experimental trials.

Herbs fortification was tried in alone or in combination; Combinations get better result than alone, therefore all possible combinations were tried and best level of each combinations was selected for further study …

| Sr. No | Herbs | Percent of Herbs (Alone) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Peppermint | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 2. | Tulsi | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 3. | Lemongrass | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

**Preliminary trials**

Preliminary trials of various levels of Tulsi in combination with 4 percent peppermint extract, where the level of peppermint 4 percent was constant. The Combination trials were carried out and on the basis of sensory evaluation and the best level was finalized for experimental trials.

$T_0$: Control

$T_1$: Quarg type cheese + 4% Peppermint extract + 2% Tulsi extract

$T_2$: Quarg type cheese + 4% Peppermint extract + 4% Tulsi extract

$T_3$: Quarg type cheese + 4% Peppermint extract + 6% Tulsi extract

$T_4$: Quarg type cheese + 4% Peppermint extract + 8% Tulsi extract

Preliminary trials of various levels of Lemongrass in combination with 4 percent peppermint extract, where the level of peppermint 4 percent was constant. The Combination trials were carried out and on the basis of sensory evaluation and the best level was finalized for experimental trials.

$T_0$: Control

$T_1$: Quarg type cheese + 4% Peppermint extract + 2% Lemongrass extract

$T_2$: Quarg type cheese + 4% Peppermint extract + 4% Lemongrass extract

$T_3$: Quarg type cheese + 4% Peppermint extract + 6% Lemongrass extract

$T_4$: Quarg type cheese + 4% Peppermint extract + 8% Lemongrass extract

Preliminary trials of various levels of Lemongrass in combination with 4 percent Tulsi extract, where the level of tulsi 4 percent was finalized in beaker trials. The Combination trials were carried out and on the basis of sensory evaluation and the best level was finalized for experimental trials.

$T_0$: Control

$T_1$: Quarg type cheese + 4% Tulsi extract + 2% Lemongrass extract

$T_2$: Quarg type cheese + 4% Tulsi extract + 4% Lemongrass extract

$T_3$: Quarg type cheese + 4% Tulsi extract + 6% Lemongrass extract

$T_4$: Quarg type cheese + 4% Tulsi extract + 8% Lemongrass extract

**Experimental trials**

The best treatments of combination of herbs were selected on the basis of sensory evaluation by the panel of judges from each preliminary trials in same phase were studied for sensory, physico-chemical and microbial parameter.

$T_0$: Control

$T_1$: Quarg type cheese + 4% Peppermint extract + 6% Tulsi extract

$T_2$: Quarg type cheese + 4% Peppermint extract + 6% Lemongrass extract

$T_3$: Quarg type cheese + 4% Tulsi extract + 8% Lemongrass extract

**Optimized the level of Combination of herbs extract**

**Table 1:** Overall acceptability score of Quarg type cheese

| Parameter | Overall acceptability Sensory score (out of 9.0) | | | |
|---|---|---|---|---|
| Treatment | Colour and appearance | Flavour | Body and Texture | Overall Acceptability |
| $T_0$ | 14.52 | 47.62 | 34.46 | $96.61^{a}$ |
| $T_1$ | 13.26 | 47.96 | 33.72 | $94.96^{b}$ |
| $T_2$ | 13.27 | 47.90 | 33.71 | $94.88^{bc}$ |
| $T_3$ | 13.24 | 47.89 | 33.65 | $94.78^{d}$ |
| | SE ± 0.013 | SE ± 0.012 | SE ± 0.013 | SE ± 0.024 |
| | C.D. at 5% 0.039 | C.D. at 5% 0.036 | C.D. at 5% 0.039 | C.D. at 5% 0.048 |

The values with different small letters superscripts row wise differ significantly at 5 percent level of significance.

The finished product form all the treatment combinations were served to the panel of judges. Table 1 show that the mean overall score of acceptability of Quarg type cheese for the treatments $T_1$, $T_2$, $T_3$ and $T_4$ were 96.61, 94.96, 94.88 and 94.78, respectively. The highest overall acceptability score was observed in treatment $T_1$ means 4 percent peppermint extract and 6 percent tulsi of extract i.e. (94.96) than the control sample. The lowest overall acceptability score was found in treatment $T_3$ means 4 percent of tulsi extract and 6 percent lemongrass extract i.e. (94.78) in Quarg type cheese. It was observed that all treatments were significantly difference with one another.

The Quarg Cheese developed from Cow milk fortified with different forms and combination of herbs, and the study was subjected for physico chemical quality of quarg type cheese. viz., fat, protein, reducing sugar, total solid, ash, acidity, pH and moisture of the best sample of quarg type cheese was 10.91, 12.10, 2.19, 26.39, 1.17, 0.74 and 4.65, respectively.

**Conclusion**

The Quarg Cheese developed from Cow milk fortified with different forms and combination of herbs extract and concluded that 4 percent peppermint and 6 percent tulsi extract found better result on the basis of sensory evaluation and the chemical parameter contains fat (10.91%), Protein (12.10%), lactose (2.19%), total solid (26.39%), Ash (1.17%),

Acidity (0.71%) and pH (4.61). On the basis of above investigation may be concluded that the combination of peppermint and tulsi could be used to better sensory quality than other combination and physico chemical parameter of Quarg type cheese adaptable and also, provide a novelty product.

**Reference**


1. Balakrishnan A. Therapeutic use of peppermint-A review. J Pharm Sci & Res. 2015;7(7):474-476.
2. Chan K. Some aspects of toxic contaminants in herbal medicines. Chemosphere. 2003;52:1361-1371.
3. Conn EE. The world of phytochemicals. In: Gustine, D.L., Flores, H.E. (Eds.), Phytochemicals and Health. American Society of Plant Physiologists, Rockville, MD, 1995, 1-14.
4. Fenwick GR, Lutomski L, Nieman C. Licorice Glycyrrhiza global Composition, uses and analyses Food chem., 38, 119-143. J of Food Sci. 1990;54(1):74-76.
5. Gahane HB. Development of Quarg type cheese with enriched functional attributes from buffalo milk. Thesis submitted to National Dairy Research Institute, Karnal (Haryana), 2008.
6. Jessica Elizabeth De La Torre Torres, Fatma Gassara, Anne Patricia Kouassi, Satinder Kaur Brar, and Khaled Belkacemi. Spice use in food: Properties and benefits. Critical reviews in food science and nutrition. 2017;57(6):1078-1088.
7. Lai PK, Roy J. Antimicrobial and Chemo preventive Properties of Herbs and Spices. Current Medicinal Chemistry. 2004;11:1451-1460.
8. Monga S, Dhanwal P, Kumar R, Kumar A, Chhokar V. Pharmacological and physico-chemical properties of Tulsi (*Ocimum gratissimum* L.): An updated review. The Pharma Innovation Journal. 2017;6(4):181-186.
9. Mule SM, Jadhav SR, Kadam SS, Dandekar VS, Ramod SS. Low fat lassi prepared by incorporation of lemon grass (*Cymbopogon citratus* L.) extract. Asian J. Dairy & Food Res. 2018;37(1):22-25.
10. NIIR Board, National Institute of Industrial Research (India). Compendium of Medicinal Plants. National Institute of Industrial Research, 2004, 320.
11. Okuda K, Tamura Y, Yamamoto M, Inoue Y, Takahashi K, Demizu S *et al*. Identification of antimicrobial and antioxidant constituents from licorice of Russian and xinjinf Origin. Chem. Pharm. Bull. 1989;37:2528-2530.
12. Prakash P, Gupta N. Therapeutic uses of *Ocimum sanctum* Linn (Tulsi) with a note on eugenol and its pharmacological actions: a short review. Indian J Physiol Pharmacol. 2005;49(2):125-131.
13. Shrestha PM, Dhillon SS. Medicinal plant diversity and use in the highlands of Dolakha district. Nepal. J Ethnopharmacol. 2003;86(1):81-96.
14. Tapsell LC, Hemphill I, Cobiac L, Patch CS, Sullivan DR, Fenech M. *et al*., Health benefits of herbs and spices: the past, the present, the future. Med. J Aust. 2006;185:4-24.
15. UNIDO, AFO. Herbs, Spices and essential oils – post harvest operation in developing countries. UNIDO, Vienna International Center, Vienna, Austria and AFO, Rome, Italy, 2005.