INTRODUCTION

All over the world, production of fermented foods is one of the oldest food processing technologies known to man. In many oriental countries, consumption of fermented foods is common and usually produced by traditional methods. Fermentation process has been used for several thousand of years as an effective and low cost means to preserve the quality and safety of foods. Most of the developing countries today depend upon various fermented foods that are staples in the diet.

The traditional fermented foods contain high nutritive value and thus developed a diversity of flavours, aroma and textures in food substrates. Cereals and legume based foods are a major source of economical dietary energy and nutrients, worldwide. Idli is a traditional cereal/legume based naturally fermented steamed product with a soft and spongy texture, which is highly popular and widely consumed as a breakfast food in India (Steinkraus, 2005).

Idli is most popular breakfast food in south India which is very delicious and nutritious. It is prepared by steaming fermented black gram (Phaseolus mungo L.) and rice (Oryza sativa L.) batter. It makes an important contribution to the diet as a source of protein, calorie and vitamins, especially B complex vitamins, compared to the raw unfermented ingredients. The fermentation process increases the bioavailability of proteins and enhances the vitamin B content of the food. The use of daal and rice in idli is a good combination as the amino acids in them complement each other (Platt, 2004).

Idli a fermented, steam cooked breakfast food is popular all over India. Extremely scrumptious, light, fluffy and nutritious and idli is an ideal breakfast dish. Made of rice and urad daal, making idli is not difficult at all,
though its preparation takes a little time as the batter for idli requires fermentation. As it is a steamed food with minimum oil and no spices, it is very healthy food for all age group peoples (Blandino et al., 2003).

Idli is also known as “Rice cake” is a traditional food of India. It is a favourite breakfast food in south India with soft and spongy texture, attractive appearance, appetising taste and flavour with its easy digestibility and good nutritive value contribute to its increasing popularity in all parts of India and also in other countries. Idli is rich in protein and riboflavin and black gram used in it, also supplies vitamins A and D. Other legumes such as soybeans and Great Northern beans could be substituted for black gram in preparation of idli. The fermentation process breaks down the starches so that they are more readily metabolized by the body. It can be produced locally and used as a dietary supplement in developing countries to treat people suffering from protein calorie malnutrition and kwashiorkor.

Rava idli or rave idli is a variation of idli, made with Rava / sooji instead of the usual rice and urad daal. It is a specialty of the state of Karnataka and is usually served as a breakfast item. Apparently during World War II, when rice (a staple item used in idli) was short in supply, they experimented in making idli using semolina and created the now famous Rava idli. It translates to semolina idli in the Kannada language. In south India mostly Tamilnadu and Andhra Pradesh idli is famous and best breakfast, idlis are pure white in colour with softness and they are cooked by steam. It is also useful for health conscious people.

The term semolina is derived from the Italian word “Semola” which is derived from the ancient Latin Simila, meaning “Flour”. Semolina (sooji) is made from hard durum wheat. It is the starchy endosperm part only which is separated from the bran and the wheat germ and then milled into flour. This is not just an Indian flour but has many uses all over the world. In south
India, semolina is used to make savory foods like rava dosa, upma and puddings like “Kesari” or “Sheera”. In North India it is used for sweets such as “Suji halwa”. In the United States, coarser meal coming from softer types of wheats is known also as “Farina” or by the trademark “Cream of wheat”.

Semolina is the coarse, purified wheat middlings of durum wheat used in making pasta, breakfast, cereals, puddings and couscous. Semolina has high gluten content. It is high in protein, dietary fiber and carbohydrates. As it is bland in taste, it can be used to make both sweet and savory dishes. In India semolina is used to make breakfast dishes such as upma, sheera, rava idli, rava dosa, rava uttappam etc. It is also used to make snacks such as madhur vada etc. Semolina is used to make sweets such as rava ladoo, rava kheer, semolina puddings etc. It is used in making breads in small quantity to get a tasty crust (Ronhotra 2006).

Whey protein is not something new and has been available for hundreds of years to individual who valued the role of a nutritious diet in achieving optimal health. During the last 15-20 years the value of whey protein has become more widely known, especially in the area of sports nutrition. More recently, whey protein has been singled out as a super star ingredient for other types of products including ones formulated for weight loss, infant nutrition and immune support.

Whey protein concentrate (WPC) is the collection of globular proteins, isolated from whey, a by - product of cheese manufactured from cow’s milk. It is a mixture of beta - lactoglobulins (65%), alpha – lactalbumin (25%) and serum albumin (8%), which are soluble in their native forms, independent of pH. The protein fraction in whey (approximately 10% of the total dry solids within whey) comprises four major protein fractions and six minor protein fractions. The major protein fractions in whey are beta – lactoglobulin, alpha
lactalbumin, bovine serum albumin and immunoglobulins (Marshall, 2004).

Whey protein concentrate (WPC) is a co-product of the cheese making process and it is pure, all natural, high quality product that contains little to no fat, lactose or cholesterol and is a rich source of essential amino acids. In its purest form, whey protein concentrate (WPC), provides benefits for men and women of all ages, including infants and toddlers.

Whey protein concentrate (WPC) provides innumerable benefits to athletes and dieters, boosts the immune system, helps bone strength and improves overall wellness. As time goes by, new studies on whey protein concentrate (WPC) continue to verify and amplify its positive benefits. Currently, whey protein concentrate (WPC) is regarded by a growing number of people to be beneficial in cardiovascular health, athletic strength and the proper growth of infants and toddlers (Krissansen, 2007).

Whey protein concentrate (WPC) is a high quality, complete protein, with all the essential amino acids. Whey protein concentrate (WPC) is also the richest known source of naturally occurring branched chain amino acids (leucine, isoleucine and valine). Whey protein concentrate (WPC) is a soluble and very easy to digest protein. It quickly enters the body to provide the important essential amino acids needed to nourish muscles and other body tissues. Whey protein concentrate (WPC) is a white to light cream coloured product with a blend, clean flavour. Research has shown that, of all protein sources, whey protein concentrate (WPC) is digested and absorbed better than any other protein (Patel, 2003).

Whey protein concentrate (WPC) is a valuable by-product from the manufacture of cheese from cow’s milk with important nutritional and functional properties. The most abundant protein in whey is beta-
lactoglobulin and the second most abundant protein is alpha-lactalbumin. Whey protein concentrate (WPC) are ingredients widely used in the food industry in a variety of formulated products such as dairy, bakery, beverages and infant formula products due to the excellent functional properties of their proteins (Morr and Foegeding, 1990).

Whey protein concentrate (WPC) is a high protein dairy product and it is as a source of amino acids and its effect on reducing the risks of diseases such as heart disease, cancer and diabetes is the focus of ongoing research. Whey protein concentrate (WPC) is an abundant source of branched chain amino acids (BCAAs), which are used to fuel working muscles and stimulate protein synthesis. In particular, leucine plays a key role in initiating the transcription of protein synthesis. When leucine is ingested in high amounts, such as with whey protein concentrate (WPC) supplementation, there is greater stimulation of protein synthesis, which may speed recovery and adaptation to exercise.

Recent studies by Dr. Donald Laymen, a Professor at the University of Illinois, have highlighted the role of the essential amino acid leucine in improving body composition. High quality whey protein is rich in leucine to help preserve lean muscle tissue while promoting fat loss. Whey protein contains more leucine then milk protein, egg protein and soy protein. Whey protein concentrate (WPC) to stabilize blood glucose levels by slowing the absorption of glucose into the bloodstream. It is a perfect complement to any low carbohydrate or low glycemic index diet plan.

In 1985 a joint report by the World Health Organisation (WHO), Food and Agriculture Organization (FAO) of the United Nations and the United Nations Universities (UNU) provided dietary protein and amino acid intake recommendations. Scientists now better understand the amino acid requirements in a wide variety of populations including infants, adults,
elderly and malnourished populations. The 2007 WHO / FAO / UNU recommendations suggested a significant increase in isoleucine, lysine, phenylalanine, tyrosine, threonine and valine, plus a modest increase for sulphur containing amino acids methionine and cysteine. Whey protein concentrate (WPC) provide a surplus of EAAs and BCAAs. The increased levels of BCAAs (leucine, isoleucine and valine) provide additional stimulus for muscle synthesis and growth.

Idli fortified with whey protein concentrate (WPC) is very delicious, nutritious and healthful. It is also an ideal food for weight watchers. As it is steamed food, high in protein and low fat content and it is easily digestible. The development of idli fortified with whey protein concentrate (WPC) will be used in the dietetic treatment of patients who were suffering from diabetes, liver disease and protein energy malnutrition (PEM) because this product contains all the essential nutrients that are considered healthy for human health.

The present research work “Process optimization of idli fortified with whey protein concentrate (WPC)” was conducted with the following objectives:

1. To optimize the process of preparation of idli fortified with whey protein concentrate (WPC).
2. To assess the organoleptic characteristics of idli fortified with whey protein concentrate (WPC).
3. To assess the chemical composition of idli fortified with whey protein concentrate (WPC).
4. To determine the shelf life of the prepared product.
5. To estimate the cost of the product.