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STANDARDISATION, ORGANOLEPTIC EVALUATION AND BIOCHEMICAL EVALUATION OF RECIPES USING OATS AND FLAX SEED

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ABSTRACT

Nutrition and health are two sides of coin and therefore inseparable. However, the nutritional value of food is not primarily what makes people to eat. It is it colour, flavour, texture, temperature and presentation. The present study was undertaken with objectives of evolving standardized nutritious recipes containing oats and flaxseed in substantial amounts, finding out their acceptability and biochemical estimation. Four recipes, Dalia, Poha, Toast and Pancake were standardized. Sensory evaluation of these recipes was done by selected of panel of 8 on 5 points shall score card referring Hopkins scale. Biochemical estimation was done using AOAC standards. The recipes scored between good and very good. The biochemical estimation was found to be; Dalia- moisture 62.4%, protein 16.8%, fat 3.03%, ash 1.8, fibre 1.6%, Poha – moisture 33.2%, protein 13.5%, fat 22.5%, ash 2.6%, fibre 1.9%, Toast – moisture 39.3%, protein 9.8%, fat 24.7%, ash 2.8%, fibre 1.8% and Pancake – moisture 38.1%, protein 14.6%, fat 25.5%,ash 1.8%, fibre 1.5%. The study concluded that in spite of its insipid and bitter taste, oats and flax seeds can be incorporated and accepted in dishes. Furthermore, incorporation may play beneficial impact to common man and patient suffering from lifestyle diseases, diabetes, constipation, cancer and celiac disease.

Key words- Lifestyle Diseases, Sensory Evaluation, Biochemical Estimation, AOAC.

INTRODUCTION

Nutrition is the science of foods, the nutrients and other substances, there in, their action, interaction and balance in relationship to health disease, the process by while the organism ingests, digest, absorbs, transports and utilizes nutrients and disposes of their end products. In addition, nutrition is concerned with social, economic, cultural, and psychological implication of food and eating.

Good nutrition means an adequate well balanced diet combined with regular physical activity. It is a fundamental requirement for positive health, functional efficiency and productivity (11th Five Year Plan, 2007-2012 (2006)).

"He who has health has hope
And he who has hope everything"- **Arab Proverb**

For the purpose of meeting the needs of the body for growth and maintenance, foods have generally been placed into three basic categories referred to as food groups on the basis of the nutrients they supply for the energy – giving, body building, maintenance and protective need of the body. A fourth group covering miscellaneous foods may be added to this with the purpose of including all those items used in food preparation which enhance the quality and acceptability of food, but may or may not enhance the nutritional quality or promote health. It is universally accepted that the nutritional value of food is not primarily what makes people eat. It is its color, flavor, texture, temperature and presentation. One food taken from each food group at every meal would ensure balance in the plans, not only in terms of nutrients but also colour, texture, flavour, and other factors which make food more acceptable and palatable (Sethi, 2011).

QUALITY

When dealing with food materials and meal preparation for consumers it is hard to define the term quality because it means different things to different people. John W. Buick has defined quality as the degree of excellence that can be offered to or accepted by the customer. The factors that make food more acceptable are chiefly those that directly affect palatability of meals as indicated in this picture.

Whatever the criteria employed for judging the quality of food prepared and served, what is certain is that the customer demands acceptable quality. Obviously, it does not signify the most superior or best grade, so some means need to be devised to decide on where to draw the line in

terms of selecting ingredients, and methods of putting them together to suit the expectation of the consumers. This picture indicates some factors on which quality assessments may be based. Thus, it is necessary to lay down standards for each of the quality characteristics and be able to control them at every stage of the production cycle.

SENSORY QUALITY

This refers to those characteristics of food which can be identified by use of our senses such as, appearance, smell, feel.

APPEARANCE

It is common experience that if food does not look good when served, it will be rejected even if its taste is good.

COLOUR

Food gets their colour in many different ways i.e from natural plant and animal pigments, from the effect of heat on color and Synthetic colorants.

FLAVOUR

Once the eyes are satisfied with the quality, the sensory organs of the nose and mouth take over. The customer then gets affected by what is called flavour of foods. Flavour relates to the combined sensation of odour or aroma, taste and feel of food in the mouth.

AROMA

Several compounds present in foods are responsible for *flavour and aroma.* These substances are very sensitive to oxidation and high temperatures, and tend to interact with each other. It is for this reason that flavor change with time and temperature.

Flavour acceptance or rejection, however, is also influenced by people`s cultural, regional and religious backgrounds. the age old proverb *one man`s meat is another man`s poison* is so apt when dealing with food acceptances.

ODOUR

The part that odours play in food acceptability is clear from the fact that very often odours put people off a food even without their tasting it. Odours can be described as pungent, minty, putrid, and so on.

MOUTH FEEL

The next component of flavour is mouth feel. Depending on how the food feels in the mouth it may be rejected if it contains too many chillies or spices which irritate the membranes of the mouth. If the food is too hot in terms of temperature, it causes blisters or pain. Again, the most favourite foods can be rejected if they are too slippery, sticky or hard to bite into.

TASTE

After the odour is accepted the next sensory tests of quality is the taste, that is, the reaction of the taste buds to the food, determining whether it is sweet, sour, salty, or bitter. Most foods contain a mixture of some or all the sensations of taste. Acceptability of the food therefore depends on how well they harmonise to make the net sensation pleasurable.

TEXTURE

Texture of a food can be determined both by *perception* and *mouth feel*. It varies from food to food and in the same food too when different methods of cooking are used. Texture also depends on the structural composition of food. This quality can be described as rough, smooth, grainy, coarse, fine, crisp, viscous, spongy and heavy (Sethi, 2011).

OATS

Oats (*Avena sativa*) form one of the most nutritious of all cereals for human use, but the chief disadvantage is the difficulty in removing large proportion of hulls (20-30 percent) from the grain. Oat meal obtained from the removal of husk is a common article of breakfast (porridge) in Europe (Manay and Shadaksharaswamy, 2010).

SCIENTIFIC CLASSIFICATION

Kingdom	:	Plantae
Order	:	poales
Family	:	Poaceae
Genus	:	Avena
Species	:	*A. Sativa*

COMPOSITION

Table – 1 - Chemical composition of oats

Product	Test wt. 1b/bu	Protein %	Fat %	Crude Fiber	Cell Wall % NDF	Ash %
Whole oats	38.05	12.1	5.1	12.1	32	3.4
Groat	52.0	15.8	7.2	2.8	7.0	1.9

Starch is the major carbohydrate in oats, averaging 52.8% and ranging from 43.7% to 61% the carbohydrate fraction is low in free sugars, any lose content is 19%-28%. Starch level is varies inversely with protein content (Coffinan, 1986). Oats provide one of the richest sources of the dietary soluble fiber beta-glucan, providing 5.0 g

(oatmeal) to 7.2g (oat bran) per 100 g serving (De Groot *et.al.,* 1963). Both are also valuable sources of total dietary fiber, which ranges from 9.9-14.9g per 100 g serving. In oats, the mixed-linked (1-3, 1-4)-β-D-glucan, referred to as β-glucan, is a major component of the endosperm cell walls (Burke *et.al.,* 1974). The physiological effects are probably related to the gel forming properties of β-glucan, which increase viscosity of intestinal chyme. And increased viscosity disturbs micelle formation, which may inhibit cholesterol absorption, slow cholesterol transfer across the unstirred layer, and increase bile acid excretion by inhibiting bile acid reabsorption (Colleoni, 2003). Oat proteins fraction includes high emulsion forming, fats-absorbing, and hydrating properties, but it lacks gluten-forming properties (Gansmann, 1998, Ravi *et.al.,* 2000, Berghofer, 2000 Pyle, 1988 and Ma et.al., 1984). The injurious constituent of wheat in patients with celiac disease is α-gliadin in the prolamin fraction of wheat gluten (Dicke *et.al.,* 1953, Van *et.al.,* 1953 and Kendall *et.al.,* 1972). Oats do not yield gliadin (Moulton, 1959). The counterpart of gliadin in oats is avenin (Baker, 1954).

In 2007, a study showed that all the varieties of oats tested were immunogenic**,** with Lampton and Ava avenins inducing lymphocyte activation similar to that activated by wheat gliadin, while Astra and Nave avenins showed less immunogenicity, but still with a measurable effect (Silano *et.al.,* 2000).

Soluble fiber may also delay gastric emptying and reduce a postprandial insulin concentration, which also inhibits cholesterol biosynthesis (Ink *et.al.,* 1997). It concluded some oat strains are more toxic than others.

The hypocholesterolemic effects of oats are well documented in over 50 clinical studies. However, oats also exert cardiovascular benefits that go beyond its cholesterol-reducing properties. Details follow on the impact of oats on four key CHD risk factors

- Blood cholesterol
- Diabetes
- Hypertension
- Obesity

A number of studies indicate that beta-glucan is the major active cholesterol-reducing component of oats. When beta-glucans are fed in a dose-dependent manner, significantly greater reductions in blood cholesterol are observed as beta-glucan content increases (Behall et.al., 1997). Furthermore, treatment of oats with enzymes that destroy beta-glucan results in a loss of cholesterol-lowering potential of oats (Shinnick and Marlett, 1993).

Approximately 79-96% of the beneficial changes in postprandial glucose and insulin are attributable to the viscous soluble fiber in oats, beta-glucan (Wood *et.al.,* 1994). When noninsulin dependent diabetic subjects were fed meals containing oat bran cereal with a beta-glucan content ranging from 4.0-8.4 g, an inverse relationship between the beta-glucan content and postprandial elevations in blood glucose and insulin was observed (Tappy *et.al.,* 1996).

It has been postulated that the viscous soluble fiber in oats yields positive effects on blood pressure by improving glycemic and insulinemic profiles. Although both conditions are generally associated with one another, it remains unclear whether insulin resistance and hyperinsulinemia are causes and/or consequences of hypertension (Gondal *et.al.,* 1996).

Obesity is an independent risk factor for the development of coronary artery disease and also exacerbates other CHD risk factors such as dyslipidemia, high blood pressure, and elevated blood glucose. Observational studies show that patients who lose weight show an improvement in coronary risk profile (Sakata, 1995).

The serum lipid response and dietary adaptation to recommended daily inclusion of instant oats in an otherwise regular diet. Hypercholestrolemic adults were randomly assigned to a control or intervention group. Participants in the intervention group were given packages of instant oats and requested to eat two servings per day, substituting the oats for other carbohydrate foods in order to maintain baseline calorie intake and keep weight stable. Serum lipids were measured. It was seen that daily inclusion of two ounces of oats appeared to facilitate reduction of serum total cholesterol and LDL –C in these hyperlipidemic individuals (Van Horn et.al., 1991).

FLAX SEED

Flax is an erect annual plant growing to 1.2 m (3 ft 11 in) tall, with slender stems.

SCIENTIFIC CLASSIFICATION

Kingdom	:	Plantae
Order	:	malpighiales
Family	:	linaceae
Genus	:	linum
Species	:	*L.usitatissimum*

COMPOSITION

Table – 2 - Composition of flax seed

Form flax	Weight	Common measure	Energy (kcal)	Total fat	Ala	Protein	Total cho	Total dietary fibre
Proximate analysis	100		450	41	23	20	29	28
Whole seed	180	1 cup	810	74	41	36	52	50

	11 4	1 tbsp 1 tsp	50 18	4.5 1.6	2.5 0.9	2.2 .8	3 1.2	3 1.0
Milled seed	130 8 2.7	1cup 1 tbsp 1 tsp	585 36 12	53 3.3 1.1	30 1.8 .6	26 1.6 0.5	38 2.3 .8	36 2.2 .8
Flax oil	100 14 5	 1 tbsp 1 tsp	884 124 44	100 14 5	57 8 2.8	- - -	- - -	- - -

Two types of flax are grown, seed flax, for the oil in its seed, and fiber flax, for the fiber in its stem.

Flax contains both soluble and insoluble dietary fibre. The soluble and insoluble dietary fibre content of flax varies, as shown below, depending on the method of fibre extraction and chemical analysis (Daum et.al., 2003). Flax has been suggested to protect against cardiovascular disease (CVD). The ability of whole flaxseed (or its powder) to reduce cholesterol in humans has been supported in several studies. A review of 9 clinical trials suggests that 15-50 grams of flaxseed a day (either whole or powder) can modestly reduce total and LDL cholesterol by 1.6 to 18% in both normo– and hypertensive patients without any significant effects on HDL or triglycerides (Lilian, 1996).

Flaxseed is the richest source of the mammalian lignan precursor secoisolariciresinol diglycoside (SDG). SDG is converted to the lignans enterolactone and enterodiol in the colon by intestinal bacteria. Lignans have a very similar chemical structure to some of the therapies available for breast cancer, and recent research has focused on using lignans for cancer treatment and their role in cancer prevention (Thompson, 2005). Thus, keeping in view the nutritive quality of oats and flaxseeds and making utilization of it in the diet, four recipes evoked from using oats and flax seeds were standardized to evaluate the acceptability organoleptic tests, biochemically estimate the moisture, protein, fat, crude fibre and ash content of four recipes and calculate nutritive value of these recipes.

MATERIALS AND METHODS

The aim of the present study was to evolve and standardize recipes using oats and flaxseeds in substantial amounts. It was a step to explore whether the recipes containing oats and flaxseeds can be made palatable and acceptable or not. The oats and flaxseed containing recipe was biochemically analyzed for the amount of moisture, protein, carbohydrate and crude fiber. The other ingredients elected for various preparations included commonly used and locally available cereals, pulses, fruit and vegetables. Refined vegetable oil was used as a medium for cooking. Effort was made to incorporate the minimum quantity of oil in preparation of recipes in order to make them healthier.

SATANDARDIZATION AND SENSORY EVALUATION OF RECIPES

When the quality of food products is assessed by means of human sensory organs, the evaluation is said to be sensory or subjective or organoleptic. Every time food was eaten a judgment is made sensory evaluation consists of judging the quality of food by a panel of judges.

A panel of judges consisting of 08 lecturers, Principal, Head librarian was selected of Government Home Science College, Chandigarh. Acceptability and organoleptic scoring of the preparations was done on the basis of the scores given by the judges. The recipes were prepared in the college premises. The recipes were evaluated for.

1) Appearance
2) Texture
3) Taste
4) Flavor,
5) Overall acceptability.

The score card for assuring the quality of the product was developed according to Hopkins's (1950) eleven point scale which was modified to a seven point scale. A copy of score card was given to each judge.

THE FOLLOWING POINTS WERE TAKEN IN TO CONSIDERATION

1. The judges were not allowed to enter the preparation area, as they could gain information which could influence their judgment.
2. They were not allowed to consult each other, but were asked to give unbiased opinion.
3. The judges were provided with a glass of water each for oral revising between the samples.
4. Time intervals between the samples were kept constant.

The different scores were

TERM		GRADE
Excellent	-	05
Very Good	-	04
Good	-	03
Fair	-	02
Bad	-	01

Recipes evoked from oats and flaxseeds as follows:

1) Dalia
2) Poha
3) Oats toast
4) Pancake

RECIPES EVOKED FROM OATS AND FLAXSEED IS AS FOLLOW

DALIA

Ingredients	Amounts
Oats	30 gm
Sugar	10 gm
Flaxseed	5 gm
Milk	150 ml

Method

1. Boil the milk on slow fame
2. Add oats and sugar
3. Then, cook it 5-10 minutes
4. Add flaxseed powder; stir continuously until the powder is properly mixed.
5. Serve hot Dalia in bowl

POHA

Ingredients	Amounts
Quaker oats	50gm
flax seed	5gm
capsicum	25gm
onion	25gm
potato	30gm
peanuts	10gm
rai	2gm
kadi patta	4

Method

1) Roast the oats in a frying pan for 3-4 minutes, set aside to cool it.
2) Heat oil in pan; add rai and red chili when it splutters add potato and peanuts.
3) Add seasoning and Quaker oats and stirring continuously. Sprinkle lemon juice and Garnish with coriander leaves.

OAT TOAST

Ingredients	Amounts
For the topping	25 gm
Semolina	
Rolled Oats	50 gm
Green Chilies	2
Coriander	10 gm
Capsicum	20 gm
Onion	20 gm
Tomato	20 gm
Salt	1 tsp
Cream	25 gm
Flax seed	5 gm
Other Ingredients -Whole wheat bread	4
Oil	25

Method

1) Combine all topping ingredients and mix well to make a smooth paste.
2) Brush oil one side of each bread slice.
3) Place each bread slice on a flat surface, with the brushed side facing down and spread a portion of the topping evenly over it.
4) Place open sandwich on a nonstick tava with the
5) Topping sides facing down ward and cook using 1/4 tsp oil.
6) Cut each toast in to 4 equal triangles.

PANCAKE

Ingredients	Amount
Wheat flour whole	25
Oats flour	30
Powdered sugar	50
Oil	1tps
Milk	50ml
Fruit salt	1/2tsp
Flax seed	5gm
Honey	2tsp

Method

1) Combine all the ingredients except the fruit salt in a bowl with milk
2) Whisk till it is a smooth batter.
3) Heat a non stick pan and grease with a little butter.
4) Add the fruit salt to the batter and mix well. Divide in to 6 equal portions.
5) Pour a spoonful of the batter on the pan to make pancake cook both sides on slow flame till golden brown.
6) Repeat with the remaining batter to make 3 more pancakes.
7) Serve hot with honey.

BIOCHEMICAL EVALUATION

Biochemical analysis was carried out to determine its nutritive value. These four recipes were analyzed for the following parameters:

- Moisture
- Protein
- Fat
- Ash
- Crude fibre

The methods adopted for determination of the above criteria are described below:

i. MOISTURE (AOAC, 1990)

CALCULATIONS

$$\text{Moisture (\%)} = \frac{\text{Loss of weight (g)}}{\text{Weight of sample (g)}} \times 100$$

ii. ASH (AOAC, 1990)

CALCULATIONS

$$\text{Ash (\%)} = \frac{\text{Weight of ash (g)}}{\text{Weight of sample (g)}} \times 100$$

iii. CRUDE PROTEIN (AOAC, 1990)

Protein was determined by using the Micro-kjeldhal method by using the factor 6.25 for converting nitrogen content into crude protein.

CALCULATIONS

$$\text{Nitrogen (\%)} = \frac{\text{Titre value} \times 0.00014 \times \text{Volume made (ml)}}{\text{Aliquot taken (ml)} \times \text{Weight of sample (g)}} \times 100$$

Crude Protein (%) = Nitrogen (%) x 6.25

iv. CRUDE FAT (AOAC, 1990)

CALCULATIONS

$$\text{Fat (\%)} = \frac{\text{Amount of ether extract (ml)}}{\text{Weight of sample (g)}} \times 100$$

v. CRUDE FIBRE (AOAC, 1990)

CALCULATIONS

$$\text{Crude Fibre (\%)} = \frac{\text{Wt of sample (g) (before ignition)} - \text{Wt of sample (g) (after ignition)}}{\text{Weight of sample (g)}} \times 100$$

vi. NEUTRAL DETERGENT FIBRE (NDF)

NDF was estimated by the method suggested by Van Soest and Wine (1967).

CALCULATIONS

$$\text{NDF (\%)} = \frac{\text{(Weight of crucible + Fibre content) (g)} - \text{Weight of crucible (g)}}{\text{Weight of sample (g)}} \times 100$$

vii. ACID DETERGENT FIBRE (ADF)

CALCULATIONS

$$\text{ADF (\%)} = \frac{\text{(Weight of crucible + Fibre content) (g)} - \text{Weight of crucible (g)}}{\text{Weight of sample (g)}} \times 100$$

RESULTS AND DISCUSSIONS

The present study deals with the biochemical analysis of best four recipes made by oats and flaxseeds with respect to moisture, protein, fat, crude fiber and ash content, the preparation and standardization of recipes containing oats and flaxseed as basic ingredient and their organoleptic acceptability.

The results of the present investigation have been presented under following headings:-

1) Organoleptic evaluation
2) Nutritive contribution of standardized recipes

ORGANOLEPTIC EVALUATION ON A FIVE POINTS SCALE (1-5)

Table: 3- Average score of organoleptic evaluation of recipes

S.no	Recipes	Appearance	Texture	Taste	Flavor	Overall acceptability
1)	Daliya	4.9	4.9	4.5	4.5	5
2)	Poha	5	5	49	4.8	5
3)	Toast	5	4.8	5	4.8	5
4)	pancake	4.8	5	4.8	4.8	5

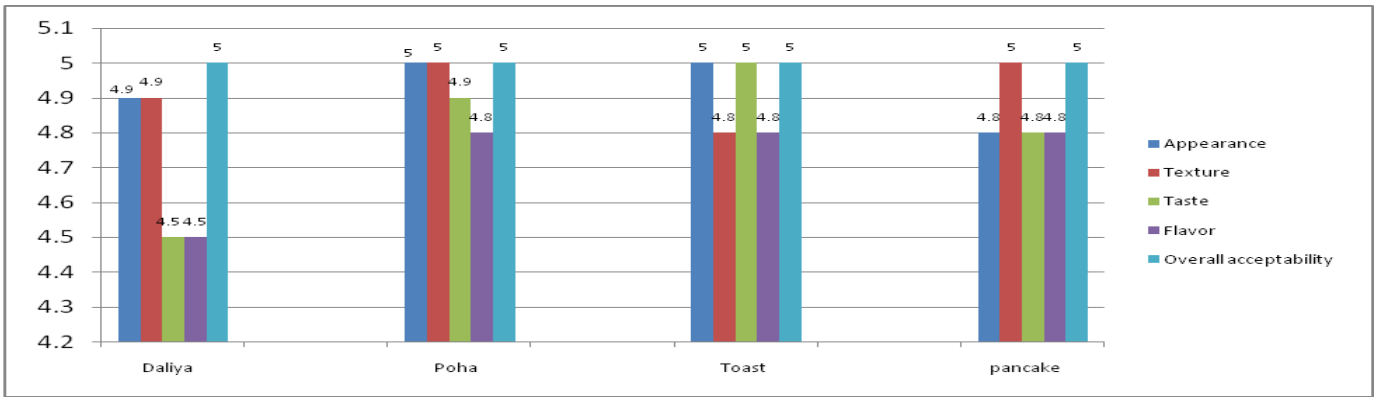

Figure – (1)- Average score of organoleptic evaluation of recipes

DALIYA

The appearance, Taste flavor and overall acceptability were rated between very good and excellent as it served 4.1, 4.2, 4.7 and 4.8 respectively. There texture were ranked below good and very good (score 3.9)

POHA

The appearance, texture and flavor were rated very well as it scored 4 points. Taste were rated between very good and excellent (score 4.2). The overall acceptability were ranked between good and very good (Score 3.2)

TOAST

It scored 4.3, 4.2, 4.3, 4.2 and 4.3 with respect to appearance, texture, taste, flavor and overall acceptability it was ranked between very good and excellent.

PANCAKE

The appearance, taste, flavor and over all acceptability was rated between excellent and very good (4.8 points each) The texture of pancake was rated excellent as it score 5.0 points).

BIOCHEMICAL ANALYSIS

Biochemical analysis of oats Dalia, oats toast, pancake, and oats Poha. It was analyzed for the following parameters and moisture, ash, fat, protein, fibre.

Table 4- Percentage of Moisture, Protein, Ash, Fat and Fibre

Items	Moisture	Protein	Ash	Fat	Fibre
Daliya	62.4	16.8	1.8	3.03	1.6
Poha	33.2	13.5	2.6	22.5	1.90
Toast	39.3	9.8	2.8	24.7	1.86
Pancake	38.1	14.63	1.84	25.5	1.5

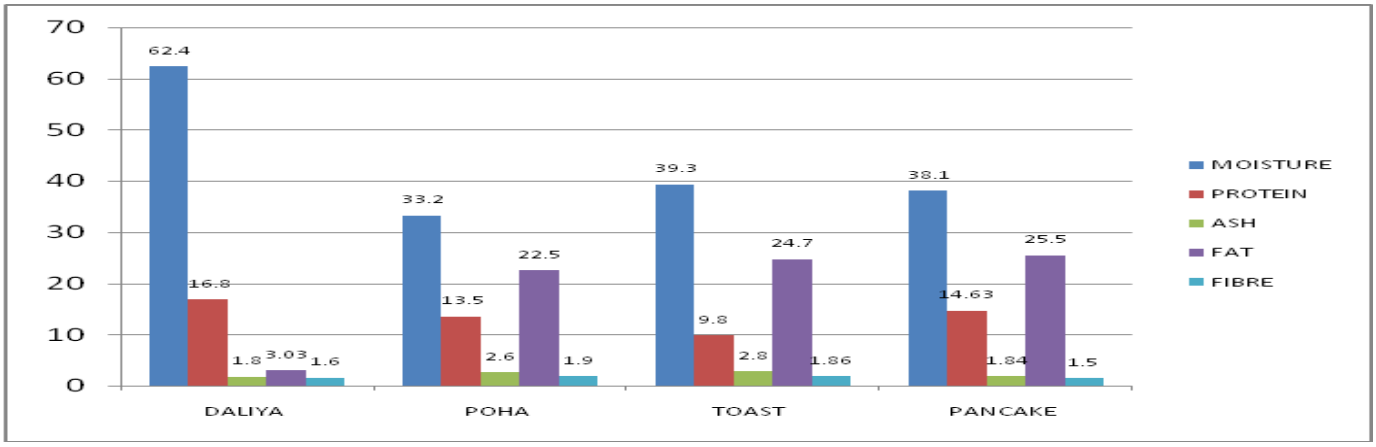

Figure 2- Table 4- Percentage of Moisture, Protein, Ash, Fat and Fibre

From the above table it is clear oats dalia contains 62.4 % of moisture, 16.8 % of protein, 1.8 % of ash, 3.03 % of fat, 1.6 % of fiber. Poha contains 33.2 % of moisture, 13.5 % of protein, 2.6 % of ash, 22.5 % of fat, 1.90 % of fiber. Oats toast contains 39.3 % of moisture, 9.8 % of protein, 2.8% of ash, 24.7 % of fat, 1.86 % of fiber. Pancake contains 38.1 % of moisture, 14.6 % of protein, 1.8 % of ash, 25.5 % of fat, 1.5 % of fiber.

The injurious constituent of wheat in patients with celiac disease is α-gliadin in the prolamin fraction of wheat gluten (Dicke *et.al.*, 1953, Van *et.al.*, 1953 and Kendall *et.al.*, 1972. Oats do not yield gliadin (Moulton, 1959). The counterpart of gliadin in oats is avenin (Baker, 1974). A number of studies indicate that beta-glucan is the major active cholesterol-reducing component of oats. When beta-glucans are fed in a dose-dependent manner, significantly greater reductions in blood cholesterol are observed as beta-glucan content increases (Behall et.al., 1997). It has been postulated that the viscous soluble fiber in oats yields positive effects on blood pressure by improving glycemic and insulinemic profiles (Gondal *et.al.*, 1996) It was also seen that daily inclusion of two ounces of oats appeared to facilitate reduction of serum total cholesterol and LDL –C in these hyperlipidemic individuals (Van Horn et.al., 1991). Flax has been suggested to protect against cardiovascular disease (CVD). The ability of whole flaxseed (or its powder) to reduce cholesterol in humans has been supported in several studies.

CONCLUSIONS

The present study was conducted to Standardization, Organoleptic and Biochemical Evaluation of Recipes using Oats and Flax seed. Nutrition and health are two sides of coin and therefore inseparable while go heath in the ultimate objective of nutrition, and nutrition is the vital component of heath. It is universally accepted that the nutritional value of food is not primarily what makes people to eat. It is it colour, flavour, texture, temperature and presentation.

Oats form one of the most nutritious of all cereals for human use. Oats contain more soluble fibre than any other grain, resulting in slower digestion and an extended sensation of fullness. Flax seed is an ancient crop used both as source

of both fiber and edible seed. Flax seed oil has been used for high cholesterol levels and in the prevention of cancer.

The general acceptability of most of the recipes was very good. Most of them scored between good and very good in all parameters. It was found that oats dalia contained 62.4% of moisture, 16.8% of protein, 1.8% of ash, 3.03% of fat and 1.6 % of fibre. Poha contained 33.2% of moisture, 13.5% of protein, 2.6% of ash, 22.5% of fat, 1.9% of fibre. The toast made contained 39.3% of moisture, 9.8% of protein, 2.8% of ash, 24.7 % of fat, and 1.86 % of fibre. Pancake contained 38.1% of moisture, 14.6% of protein, 1.8% of ash, 25.5% of fat, 1.5% of fibre.

Thus, the present study revealed that the evolved recipes containing oats and flaxseed in substantial amounts were palatable and accepted. These recipes can be used in daily diets for the beneficial effects on one's health apart from their being used for therapeutic condition like constipation, obesity, celiac, cancer and cardiac problems etc. As oats and flaxseed has insipid taste, it is not generally accepted by many people. Thus, the recipes standardized in the present study enable the common man and patients to select healthy choices of food among the evolved oats and flax seed recipes and take the benefit of nature's wonderful cereal and seed.

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