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Research Article

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Effects of edible coatings on the shelf life and quality of potato (*Solanum tuberosum L.)* tubers during storage

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ABSTRACT

The effects of different edible coating on the quality and shelf life of potatoes during 60 days of storage at 20 ± 1ºC were investigated. Four different combinations of chitosan with whey protein and coconut oil (lipid) have been used. The potato tubers were coated and stored along with uncoated (control) potato tubers. They were periodically tested for different quality attributes like visual appearance, weight loss, respiration rate, soluble solids, pH, ascorbic acid, firmness and decay percentage. The results indicated that coated potatoes showed reduced rate of weight loss, respiration, decay percentage, soluble solids, shrinking and wrinkle development compared with uncoated. The shelf life of coated potatoes increased to 60 days compared to control (uncoated) ones which lasted up to 45 days, thereby offering a large advantage.

Keywords: edible coating, chitosan, potato, quality, shelf-life.

INTRODUCTION

Edible coatings are thin layers of edible polymeric materials directly deposited or applied on the surface of food items such as fresh fruits and vegetables that can be eaten by the consumer as part of whole food product [1]. Edible films are biodegradable, environmentally friendly, economic, consumer compatible method of food preservation that creates the modified atmosphere of fresh post harvest produce, achieved by the exchange of gases through its outer layer that leads to an atmosphere richer in carbon dioxide and poorer in oxygen [2-4]. The ingredients used in edible coatings are obtained from natural sources which are Generally Recognized as Safe (GRAS) materials provide several advantages over synthetic material [4]. Potato is the fourth most important food crop in the world after rice, wheat and maize [5]. In the face of tremendous growth of population, potato is a critical crop in terms of food security [5]. Potatoes can even be exported to some of the European countries during March-May when fresh potatoes are not available in those countries [6]. Thereby, need long term storage. Storage losses are due to sprouting, evaporation of water from tubers, changes in chemical composition, spread of diseases and damage by extreme temperature [7]. However, use of such chemicals has undesirable effects on the human system. Ogava and Hayado [8] and Ezekial *et al*. [5] reported that low-temperature storage increases sugar content that causes sweetening which in turn has bad impact on fried potatoes like discolouration. Radiation uses also give high cost and side effects, making it unsuitable for consumption. The role of natural polymer based edible coatings can be an option to improve the shelf life and increases its marketability [9]. Existing studies have focused on to study the shelf life extension on cut potatoes [10-11]. Polysaccharide, lipid, composite have been widely used as edible coatings [1-3]. Simple edible coatings that can help to extend the shelf life of potato tubers will be of significant interest for improving the marketing of the potato and potato products. Chitosan (CH) is a polysaccharide which has an excellent film forming abilities, antimicrobial properties, barrier properties which reduces moisture loss and hence has been used extensively as an edible coating to enhance the shelf life of strawberries, banana, papaya, tomato and many commercially important fruits and vegetables [3,12]. Whey protein represents 20% of the milk proteins and have excellent oxygen barrier properties compare with synthetic film due to the presence of lactose in it

[11]. Milk protein coatings were reported to effectively delay browning of apple and potato slices [11]. Chitosan and whey based edible coatings have been reported to prolong the shelf life of strawberries [13-14]. Coconut oil, which contains lauric acid adds antimicrobial property to the coatings and impart moisture barrier to the hydrophilic coatings [15]. Glycerol, a plasticizer imparts flexibility to improve the mechanical properties of the film [16-17]. Although these components have been extensively used as edible coatings on various fruits and vegetables, however, to the best of our knowledge, there are no available data regarding the effect of these edible coatings on postharvest quality of potato tubers. Therefore, the aim of present study is to investigate the potential of these edible coatings on the shelf life extension and maintaining the quality of potato tubers during storage.

EXPERIMENTAL SECTION

2. Materials and Methods:

2.1 Plant material

Uniform, homogenous potatoes free from any bruises, rot, wound, holes, stem, were received from the farm and brought directly to the research laboratory for experimental study.

2.2 Chemicals

High molecular weight chitosan (deacetylation degree: 75%) was obtained from Himedia (India). Food grade whey protein concentrate was obtained as a gift sample from Mahan protein Ltd. Delhi. All other reagents and chemicals were of analytical grade and procured from Himedia and SRL (India).

2.3 Preparation of coating solutions

CH (0.5%, w/v) was prepared by solubilising 0.5 g of CH in 100ml distilled water containing 0.5 ml (v/v) of glacial acetic acid as a medium to dissolve CH at room temperature. Glycerol (0.3%) was added as plasticizer to improve the flexibility of coating solutions and thoroughly stirred by a magnetic stirrer (Model: Tarson spinnot) for 6 h at room temperature constantly to achieve complete dispersion [18]. The pH of the solution was adjusted to 5.6 with NaOH (1N) and 0.1 ml of tween-80 was added as an emulsifier [18]. CH solution in combination with lipid was prepared by adding coconut oil (0.1ml) to the above dispersion and mixed. In order to prepare composite solutions, 5 g of whey concentrate was dissolved in 100ml distilled water followed by heating at 80°C for 30 minutes for denaturation of whey protein [17] and then it was mixed with the chitosan and lipid (coconut oil) combination solution in another set [19]. The entire composite mixture was then stirred with the help of magnetic stirrer (Model: Tarson spinnot) at room temperature for 6 h.

2.4 Application of coating solutions

The potato tubers were randomly distributed into five groups and each coating treatment had applied with two replicates. Four groups were respectively assigned to the four coating treatments (T), CH 0.5% (T1), CH 0.5% + coconut oil 0.1% (T2), CH 0.5% + whey protein 5% (T3), CH 0.5% + whey protein 5% + coconut oil 0.1% (T4), while the fifth group contained uncoated (control) potatoes dipped in distilled water designated as (T5). The potatoes were dipped into the above different coating treatments for 5 minutes and residual solution was allowed to drip off. After treatments, potatoes were air dried to remove any surface moisture for 1 h. Both coated and uncoated potatoes were stored at 20 ± 1˚C and 75-80% R.H. for 60 days. The stored samples were then subjected to the following physicochemical analysis at the beginning of the experiment and after 7, 14, 30, 45, 60 days of storage in the laboratory.

2.5 Physicochemical analysis:

2.5.1 Physiological weight loss

The initial weight of potato (0 day) was taken before applying the treatment and then at the end of each storage period (7th day). The difference between the initial and final weight of potato tuber was considered as a total physiological weight loss at each storage interval and calculated as a percentage loss in weight based on initial weight [20].

2.5.2 Decay percentage

The rotting or decay of the stored tubers was examined by their visual appearance. Decayed ones were discarded in each sample set and decay percentage was recorded during the entire storage period.

2.5.3 Shelf life
The shelf life of the tubers was calculated by counting the days till they were visually and commercially acceptable for marketing.

2.5.4 Total soluble solids (TSS) and pH
During storage, the soluble solids concentrations were examined. The TSS content of tubers were determined by using a refractometer 0-32 °Brix (Atago, Germany) which was calibrated with distilled water prior to taking readings. A homogenous sample was prepared by crushing the potato tuber and extracting its juice in a blender. The sample was filtered and few drops were taken on the prism of the refractometer. A direct reading was then taken by reading the scale as described in [20]. The pH of the same tuber samples were calculated as per the method reported by [20].

2.5.5 Ascorbic acid content
Ascorbic acid present in control and coated potatoes were determined using the Titrimetric Dye method [21]. The standard ascorbic acid solution was prepared by taking 50mg of ascorbic acid into 50 ml 3% meta-phosphoric acid solution. 5 ml of this solution was taken which then further made up to 50 ml with 3% meta-phosphoric acid solution [21]. Standard dye solution was prepared by adding 50 milligram of the dye (2, 6-dichlorophenol indo-phenol) to the 28% hot sodium hydrogen carbonate solution (150ml) and the volume was made up to 200 ml with distilled water [21]. Potato pulps (5g) were extracted with 50 ml of 3% meta-phosphoric acid using a blender. The mixture was filtered and titrated through a standard dye solution (2, 6-dichlorophenol indo-phenol) to a pink colour that persisted for 15 to 20 seconds. The ascorbic acid content of tuber sample was expressed in mg per 100 g of fresh sample [21].

2.5.6 Respiration Rate Measurement
Respiration rate was measured by auto gas analyzer (checkmate 9900 O_2/CO_2, PBI Dansensor, Denmark). For each analysis, two potatoes were placed in 500ml container hermetically sealed with a silicone rubber septum for 2 hr. After specified time, the head-space gas particularly CO_2 was sucked through a hypodermic hollow needle and the respiration rate was measured. Results were expressed in millilitres of CO_2 released per kg of commodity per hour (ml CO_2 /kg /h).

2.5.7 Firmness Measurement
Firmness values at peak force of both coated and uncoated tubers in replicates were obtained using Texture Analyzer (Model: TA HDi Stable Micro Systems, U.K). The pre-test and post-test speed of 500 N load cell was 5 mm/s and a cylindrical probe diameter size is of 50mm. The compression force on the corresponding tubers were measured at the maximum peak of recorded force and expressed as Newton (N).

2.5.8 Statistical analysis
The experiments were carried out in completely randomized design with two replications. All the analyses were performed in triplicate. The data obtained with respect to different parameters under different treatments during storage were analysed by analysis of variance (ANOVA) with treatment and storage time as sources of variation. Mean comparisons among the treatments and storage time were conducted using Tukey's test at 5% level of significance ($p < 0.05$).

RESULTS AND DISCUSSION

3.1 Effect on Weight Loss
Figure 1 shows the change in weight loss percentage of coated and uncoated potato tubers during the 60 days storage period. The application of coating treatments caused significant reduction ($p<0.05$) in weight loss as compared with the control samples. The control samples had significantly ($p<0.05$) higher weight loss percentage (11.25%) after 45 days of storage. The application of T3 (chitosan and whey protein) coating on the potato was observed to prevent weight loss more than that of other tested coating treatments (9.99%) while the T1 (chitosan coating) was less effective in reducing weight loss (10.95%) throughout the storage period. The weight loss in potatoes might be due to water loss by transpiration and other physiological mechanism, the substrate loss by respiration [22]. The less decrease in weight loss of coated ones was due to the effects of these coatings to form a semi-permeable barrier against gases like oxygen, carbon dioxide, moisture and other solute movement due to which it reduces respiration, moisture loss and oxidation [10]. The obtained results were also in conformity with the findings of Sheikh *et al.* [12] who reported that chitosan in combination with protein and polysaccharide was very effective in reducing the respiration rate and inhibiting water loss. It provides an addition barrier against diffusion through stomata. T3 (chitosan and whey protein) and T4 (composite) was more effective in forming a physical barrier to moisture loss and therefore retarding dehydration, membrane permeability and senescence.

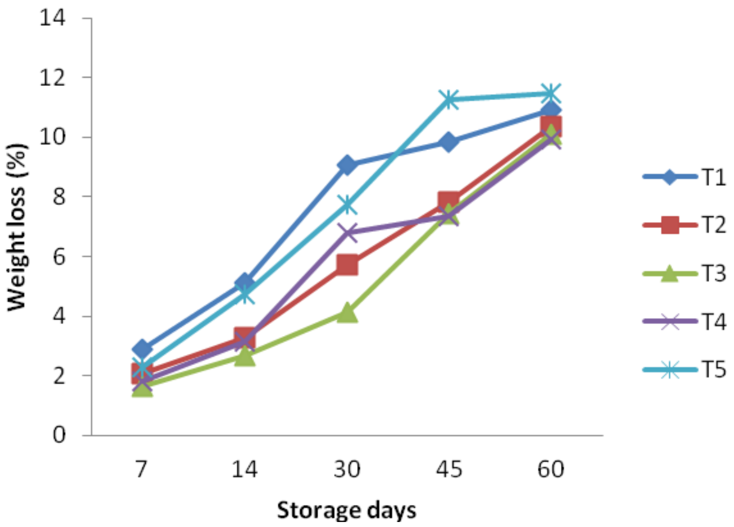

Fig. 1 Effect of edible coatings on weight loss percentage of both coated and uncoated potato tubers during 60 days of storage at 20±1°C
(where T1= CH 0.5%, T2= CH 0.5% + coconut oil 0.1%, T3= CH 0.5% + whey protein 5%, T4= CH 0.5% + whey protein 5% + coconut oil 0.1%, while the fifth group, T5 contained uncoated (control) potato tubers dipped in distilled water. CH= chitosan)

3.2 Effect on decay percentage

Data presented in Table 1 indicates the change in decay percentage values of coated and uncoated potatoes during the storage period. These coatings significantly ($p<0.05$) reduced the decay percentage as compared to that of control sample during the storage period. Between all the present treatments, T3 and T4 were more effective in controlling the decay percentage (15% and 20% respectively) than control (80%). Chitosan in combination with protein shows less decay at the end of storage period which is inconsistent with the antifungal properties of chitosan against several postharvest pathogens. El-Ghaouth *et al.* [23] suggested that chitosan induces chitinase, an enzyme which catalyzes the hydrolysis of chitin, a common component of fungal cell walls thereby preventing the growth of fungi on the surface of the commodity. The outcome indicated that among the tested treatments, T2 has relatively more decay percentage compared to T1, T3 and T4.

Table 1: Effect of edible coatings on decay percentage of both coated and uncoated potato tubers during 60 days of storage at 20±1°C

Decay percentage (%)	Treatments				
Storage period (days)	T1	T2	T3	T4	T5
7	0	0	0	0	0
14	1	1	0	0	10
30	5	10	5	5	40
45	10	15	10	10	50
60	25	30	15	20	80

(where, T1= CH 0.5% , T2= CH 0.5% + coconut oil 0.1%, T3= CH 0.5% + whey protein 5%, T4= CH 0.5% + whey protein 5% + coconut oil 0.1%, while the fifth group, T5= uncoated (control) potato tubers dipped in distilled water. CH= chitosan).

3.3 Effect on Shelf life

The shelf life of potato tuber has been extended significantly with these tested treatments. The potato tuber treated with T3 and T4 were found to extend their shelf life to 60 days as compared to control tubers (45 days). The T3 (chitosan and whey protein treated) tubers exhibited longer shelf life and reduced spoilage followed by T4 (composite) and then T2 (chitosan) and T3 (chitosan and coconut oil coated). These results also supported the view of Zhang & Quantick [24] who reported that the application of chitosan coating improved the quality and storage life in cherry, raspberries. The positive effect of a chitosan coating on storage life could be due to semi-permeable barrier created by chitosan film, which in turn allows selective exchange of oxygen and carbon dioxide, which controls the senescence of tubers and extend its shelf life [37]. Milk proteins such as whey proteins are good antioxidants and have anti-browning actions [11].

3.4 Effect on Respiration Rate

Figure 2 shows the effect of edible coatings on the respiration rate of coated and uncoated potato tubers. Respiration rate of stored tubers has been found to increase with the advancement of storage period under all the treatments. The total respiration rate of uncoated potatoes was the higher (13.28 ± 0.21 ml CO_2 /kg /h) at the end of the 45th day, whereas T3 (chitosan and protein coated) was lower (9.28 ± 0.1 ml CO_2 /kg /h) at the end of the 60th day of storage. Chitosan in combination with protein (T3) showed the least increase in respiration rate with good shine and less wrinkles on the surface of the potato. Overall differences within the treatments were not statistically significant, but between the storage period, the difference was coming out to be statistically significant ($p<0.05$). Similar results have been reported by Sheikh *et al.* [12] that whey protein can generate films and coatings which bear good oxygen, aroma compound and oil barrier properties, however, they appear to have greater oxygen permeability than other proteins like collagen, soy protein which contributes to shiny, smooth surface of the food besides protecting them from dehydration, aroma loss, moisture migration and physiological ageing. Moreover, these results indicate that coating treatment generates a semi-permeable barrier which modifies the levels of endogenous respiratory gases that delays the senescence and increase the storage life of potatoes. Lowering of the respiration rate as a result of polysaccharide based coating has also been reported for mango cultivars [10, 19]. Hence, it has been seen that edible coatings could have a dual effect of allowing the lower amount of oxygen which reduces the rate of oxidation, the activity of browning causing enzymes as well as restricting the amount of respiratory gases released, both causing beneficial effects on physiological changes of the tuber with ageing. High concentration of carbon dioxide in the internal atmosphere of the commodity reduces respiration rate as a result of coating [25]. Baldwin's result also reported that polysaccharide based coatings are less permeable to respiratory gases [10].

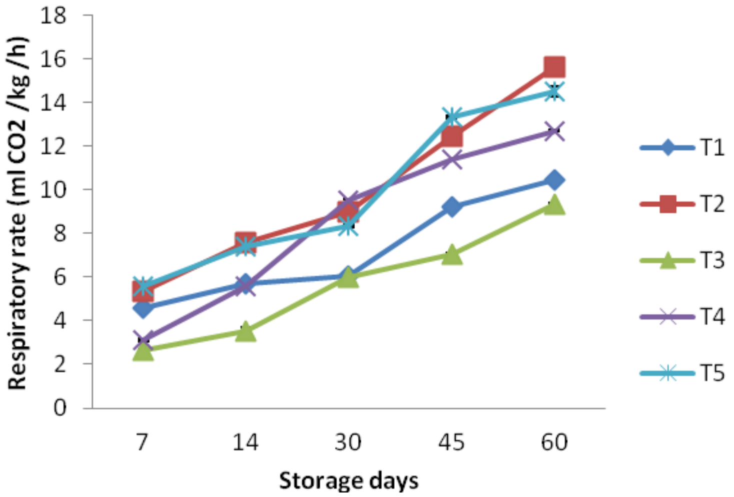

Fig. 2 Effect of edible coatings on respiratory rate of both coated and uncoated potato tubers during 60 days of storage at 20±1°C
(where, T1= CH 0.5%, T2= CH 0.5% + coconut oil 0.1%, T3= CH 0.5% + whey protein 5%, T4= CH 0.5% + whey protein 5% + coconut oil 0.1%, while the fifth group T5= uncoated (control) potato tubers dipped in distilled water. CH= chitosan)

Table 2: Effect of edible coatings on TSS of both coated and uncoated potato tubers during 60 days of storage at 20±1°C

Days	T1	T2	T3	T4	T5	Mean
07	6.7	6.3	7.1	7.2	5.2	6.5±0.36a
14	6.8	6.6	7.4	7.5	5.6	6.78±0.34a
30	6.6	6.9	7.0	7.6	7.9	7.2±0.23a
45	7.0	7.1	7.5	7.8	6.8	7.24±0.18a
60	7.2	6.9	7.4	7.5	6.7	7.25±0.13a
Means	6.86±0.1a	6.76±0.19a	7.28±0.09a	7.52±0.09ab	6.37±0.61ac	

Means followed by different letters show significant difference ($p<0.05$; Tukey's test) among the treatments and storage days and means with the same letters within columns are not significantly different at $P<0.05$ (where, T1= CH 0.5% , T2= CH 0.5% + coconut oil 0.1%, T3= CH 0.5% + whey protein 5%, T4= CH 0.5% + whey protein 5% + coconut oil 0.1%, while the fifth group T5= uncoated (control) potato tubers dipped in distilled water. CH= chitosan).

3.5 Effect on Total soluble solids (TSS) and pH

The TSS of the control samples increases and then decreases with storage time while the coated tubers experienced slower increase which then become constant during storage (Table 2). Edible coatings were better in lowering soluble solids concentration. There was no statistically significant difference between the treatments according to the data. In case of potatoes, total soluble sugar content increases as storage starch will break down into water soluble sugars as the storage time increases. It was likewise reported that during senescence, starch degrade rapidly by the united action of amylases, starch phosphorylase and 1, 6-glucosidase to sugars such as sucrose, glucose and fructose [26-27]. Moalemiyan *et al.* [27] in their study with ataulfo mangoes reported that TSS values of pectin based coated fruits were lower than that of control mangoes due to which there was slower rate of synthesis of sugars. Table 3 indicates the increase in pH as the storage time increases in both coated and uncoated potato tubers. The relatively less increase of TSS and pH in case of coated potatoes was probably due to the semi-permeable barrier created by chitosan, chitosan in combination with protein, and composite coated [12, 37]. Significant differences ($p<0.05$) were observed among the four types of coating treatment, however, chitosan alone and chitosan coatings containing protein treatment showed better control on pH and soluble solids during entire storage period as compared to other treatments.

Table 3: Effect of edible coatings on pH of both coated and uncoated potato tubers during 60 days of storage at 20±1°C

Days	T1	T2	T3	T4	T5	Mean
07	5.26	5.73	5.15	5.21	5.63	5.40±0.12a
14	5.30	5. 86	5.27	5.34	5.89	5.53±0.12ad
30	5.59	6.10	5.76	5.78	6.22	5.89±0.12bd
45	6.04	6.21	6.15	6.16	6.39	6.19±0.12c
60	6.20	6.25	6.22	6.27	6.48	6.28±0.12c
Means	5.68±0.10a	6.03±0.1a	5.71±0.22a	5.752±0.19a	6.12±0.16a	

Means followed by different letters show significant difference (p<0.05; Tukey's test) among the treatments and storage days and means with the same letters within columns are not significantly different at p<0.05 (where, T1= CH 0.5% , T2= CH 0.5% + coconut oil 0.1%, T3= CH 0.5% + whey protein 5%, T4= CH 0.5% + whey protein 5% + coconut oil 0.1%, while the fifth group T5 = uncoated (control) potato tubers dipped in distilled water. CH= chitosan).

3.6 Effect on Ascorbic acid content

Figure 3 demonstrates the effect of edible coating on the ascorbic acid content of potato tubers during storage period. Ascorbic acid is the important component in potatoes. Ascorbate is known for its use as an antioxidant and it plays a key part in photosynthesis [28]. Delay in decrease of ascorbic acid content has been seen in coated potato tubers. T3 (chitosan and whey protein) treated potatoes has relatively higher content (19.5±0.38 mg/100g) compared with other coatings and control (14.9±0.43 mg/100g) tubers at the end of 60 days storage periods. On the other hand, T1 (chitosan) and T2 (chitosan and coconut oil) coated potatoes showed relatively higher decrease (16.5±0.4mg/100g and 17±0.25mg/100g respectively) than other treatments. It was reported that bruising results in increase in vitamin C followed by 30-40 % reduction relative to unbruised potato after long weeks of storage [28-29]. Mazza *et al.* [29] also reported that ascorbic acid increases in tubers with their maturity which then gradually decreases during storage. However, the decrease of ascorbic acid content is less in coated potatoes than in uncoated potatoes. Decrease in ascorbic acid content with storage is due to its oxidation that may be caused by several factors, including exposure to oxygen, metals, light, heat and alkaline pH [30].

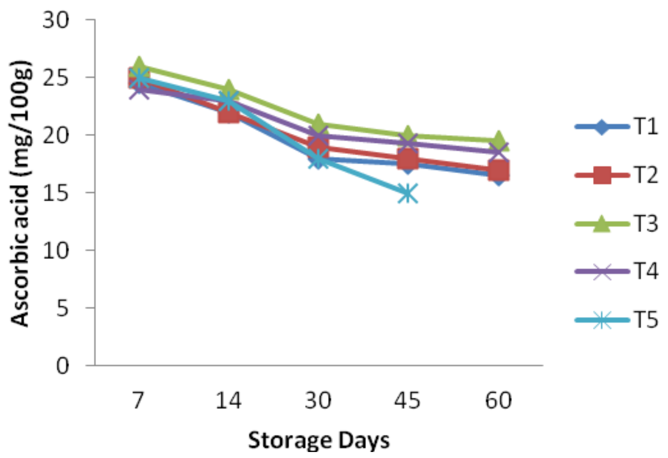

Fig. 3 Effect of edible coatings on ascorbic acid content of both coated and uncoated potato tubers during 60 days of storage at 20±1°C *(where T1= CH 0.5%, T2= CH 0.5% + coconut oil 0.1%, T3= CH 0.5% + whey protein 5%, T4= CH 0.5% + whey protein 5% + coconut oil 0.1%, while the fifth group T5= uncoated (control) potato tubers dipped in distilled water. CH= chitosan).*

3.7 Effect on Firmness

Figure 4 shows the effect of edible coatings on firmness of both coated and uncoated potato tubers during 60 days of storage period. Firmness values decrease with storage, but there was a significant difference (p<0.05) in the decrease between coated tubers and uncoated tubers. However, coated tubers have relatively higher firmness at the end of storage period than uncoated tubers. T3 (chitosan and whey protein) and T4 (chitosan, whey protein and coconut oil) coatings maintained highest tuber firmness among the coated ones followed by T2 and T1. At the end of storage of 60 days, T3 coated treatments retained about 49% higher potato firmness as compared to control (uncoated) and 33% higher over T2 (chitosan and coconut oil treatment). It was suggested that firmness decrease can be due to softening of tissues, thinning of cell walls, decrease in turgidity [31-32]. Ali *et al*. [18] and Al-Juhaimi [33] reported similar results for firmness change during storage of tomatoes treated with edible coating. Low level of oxygen and high degree of carbon dioxide reduces the natural process of softening causes enzymes, therefore permitting the retention of firmness during storage [34].

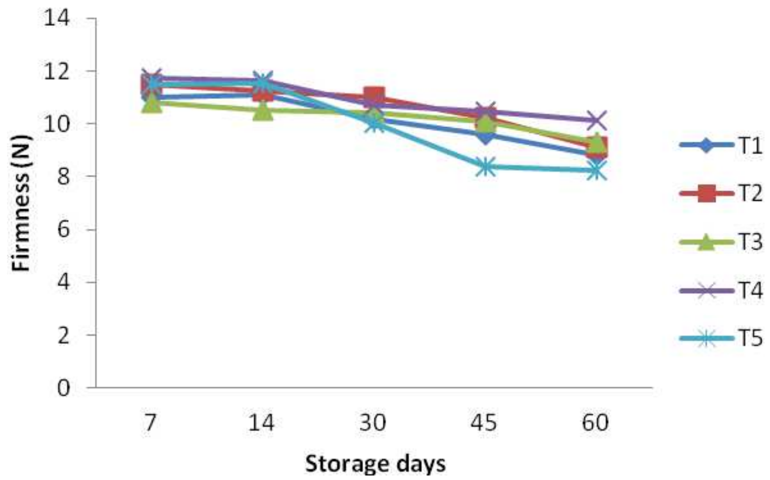

Fig. 4 Effect of edible coatings on firmness of both coated and uncoated potato tubers during 60 days of storage at 20±1°C
(where, T1= CH 0.5%, T2= CH 0.5% + coconut oil 0.1%, T3= CH 0.5% + whey protein 5%, T4= CH 0.5% + whey protein 5% + coconut oil 0.1%, while the fifth group T5 = uncoated (control) potatoes dipped in distilled water. CH= chitosan.)

3.8 Effect on Visual Appearance

One of the beneficial effect of edible coating include improvement of appearance, shine, natural gloss of potatoes as compare to uncoated ones which leads to better marketability and customer acceptability. Table 4 shows the difference in visual appearance of both coated and uncoated potato tubers during storage. After 45 days, the uncoated tubers turned unattractive because of the formation of wrinkles, shrinkage and shrivelling of skin which was due to loss of water from the tubers. Evaluation of controlled ones was discontinued after 45 days. On the other hand, even after 60 days of storage, protein & composite (T3 and T4) coated potatoes maintained good appearance and texture. This was probably due to the edible coating that forms a partial barrier on the tuber surface which controls the exchange of water from the commodity surface [12, 24, 37]. In some cases, brown spots started to develop at the end of storage period, which perhaps can also be due to anaerobic respiration [35]. Chitosan in combination with protein shows good shine and less wrinkles on the surface of the potato. Ramos *et al.* [19] also reported that whey protein can generate films and coatings which bear good oxygen, aroma and oil barrier property, however, they appear to have greater oxygen permeability than other proteins like collagen, soy protein which contributes to shiny, smooth surface of the food besides protecting them from dehydration, aroma loss, moisture migration and physiological ageing. Polysaccharide based coating can also improve the appearance of other fruits like mangoes by imparting shine [27, 35]. Edible coating can also delay ripening and prevent the occurrence of plant diseases. Amarante and Banks [36] suggested that coating can form a physical barrier against pathogenic infections, hence reducing the incidence of post harvest disease. Similar reporting was also suggested by Gol and Rao [37]. T3 and T4 show better visual appearance followed by T2 and T1.

Table 4: Effect of edible coatings on visual appearance of both coated and uncoated potato tubers during 60 days of storage at 20±1°C

Treatments	7th day	14th day	30th day	45th day	60th day
T1	Intact	Intact	Loosening of skin	Loose skin, no damage	Decay started
T2	Intact	Intact	Loosening of skin, wrinkled	Shrinkage started, loss in texture	Decay started
T3	Intact	Intact	Shine, Intact	No loss in texture	Outer appearance, shine maintained
T4	Intact	Intact	Intact	Intact, shine maintained	Outer appearance maintained
T5 (control)	Intact	Intact	Smell started, skin loosening	Decaying	Discarded

(where, T1= CH 0.5%, T2= CH 0.5% + coconut oil 0.1%, T3= CH 0.5% + whey protein 5%, T4= CH 0.5% + whey protein 5% + coconut oil 0.1%, while the fifth group T5= uncoated (control) potatoes dipped in distilled water. CH= chitosan.)

CONCLUSION

In our study, we found that chitosan (CH) coatings in combination with proteins and lipids are simple, environmentally friendly and relatively inexpensive technology that can extend the storage life of common commodities like potatoes. The application of these edible coatings on the surface of potato tubers reduces its weight loss and respiration rate, which implies that they are forming a protective barrier on the surface of the tuber. The chitosan based composite coating (T4) shows the most effective results as compared to others. Shelf life of coated potatoes increases to 60 days with no smell, blemishes, spoilage and rot in comparison with uncoated potato tubers. Texture and firmness relatively maintained throughout the storage period. Moreover, coated potatoes showed better shine than uncoated potatoes, enhancing the visual appeal of the potatoes, reduced decay, lowered the softening of tissue as compared to uncoated tubers. Due to increase in marketability, our research findings are valuable for those who are involved in the areas of potato tubers handling and processing. Further studies relating to sugar, phenolic content and antioxidant activities of these edible coated potatoes will be helpful in further strengthening our research findings.

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