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Extraction of Kaempferol from seeds of Cucurbita

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Abstract
Kaempferol is a bio-flavonoid, polyphenol, anti-oxidant role character and found in fruits and vegetables. It is a crystalline solid and soluble in dimethyl sulfoxide, ethanol and ether. It showed many pharmacological activities including anticancer, antioxidant, antimicrobial and anti- inflammatory activities etc. The present studies on optimization of parameters like effects of solvents, percentages of solvents, particle size, pH and extraction time for the extraction of Kaempferol from the seeds of Cucurbita. The Kaempferol concentration for optimized conditions was 28.0 µg/ml.

Keywords: Kaempferol, Cucurbita, extraction, optimization

Introduction
Seeds of Cucurbita belongs to Cucurbitaceae family. It contains phenolic compounds, flavonoids, phenolic acids, tannins etc. Especially thses seeds contain high amount of Bioflavonoids like quercetin, rutin and kaempferol [1]. Mainly Kaempferol is a bio-flavonoid, polyphenol, anti-oxidant role character and found in fruits and vegetables. It is a crystalline solid and soluble in dimethyl sulfoxide, ethanol and ether [2]. It showed many pharmacological activities including anticancer, antioxidant [3], antimicrobial and anti-inflammatory activities etc.

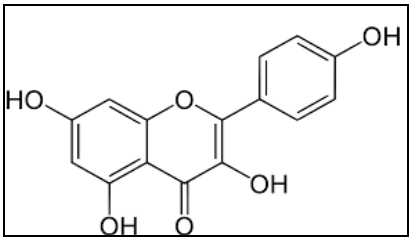

Fig 1: Kaempferol

Materials and Methods
1. **Chemicals:** Ethanol, Methanol and Hexane.
2. **Collection of plant material:** Seeds of Cucurbita was collected from a local market, Meerut. It was cleaned and dried. The dried seeds were powdered and used as a raw material.
3. **Extract preparation:** Weigh the amount of 1g of powder (125 microns) and add methanol (50 ml) in the flask. Soak the solution for 36 hours. After the soaking time filtrate the solution by using Whatman No.1 filter paper and heat the filtrate solution at 64 ° C. So that the solvent which is taken in the glass wear is evaporated [4] and finally stored that extract sample.
4. **Determination of Kaempferol flavonoid:** 1ml of extract in 10ml of methanol and the mixture was allowed to stand for 30 min. The absorbance of reaction mixture was measured at 265nm using UV spectrophotometer [5]. The Kaempferol was determined by using calibration curve.

Results
1. **Effect of Solvents:** Various solvents like ethanol, methanol, water and hexane were used to extract the optimum yield of Kaempferol from seeds of Cucurbita. Methanol solvent is shows best result for extraction of Kaempferol [6] and the concentration was 8.0 µg/ml.

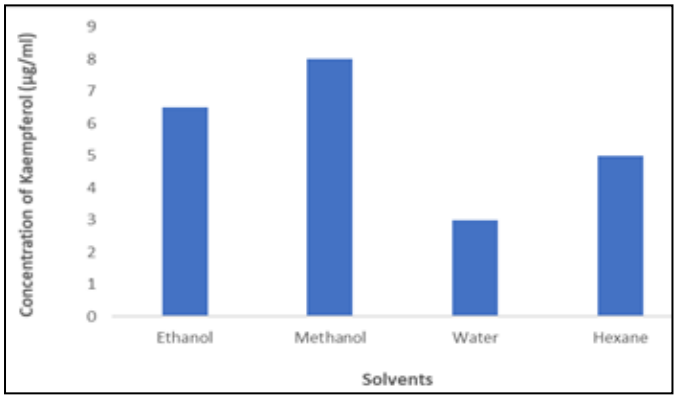

Fig 2: Effect of Solvents

2. **Effect of Solvent Percentages:** Different solvent (Methanol) percentages like 20%, 40%, 50%, 60%, 80% and 100% shows a vital role for the extraction of component. It shows that optimum solvent percentages were found to be at 80% methanol [7] for Kaempferol and its concentration was 12.0 µg/ml.

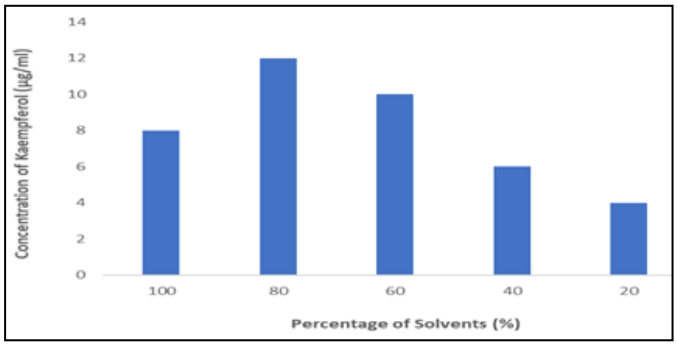

Fig 3: Effect of Solvent Percentages

3. **Effect of Particle sizes:** The various particle size viz., 205, 149 and 125 microns were used to find out the optimum concentrations of Kaempferol [8]. The present investigation suggests that the extraction of Kaempferol at different particle sizes indicates that the optimum particle size was 125 microns. The optimum concentration was 18.0 µg/ml.

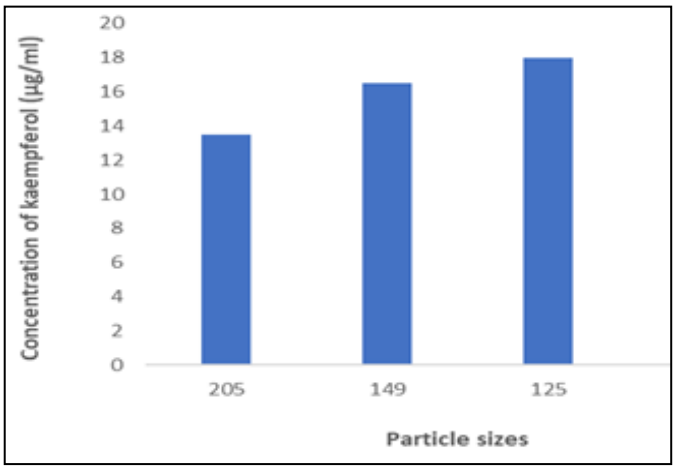

Fig 4: Effect of Particle sizes

4. **Effect of pH:** In the extraction process, the different pH values were considered such as 5, 6, 7, 8, and 9. It was observed that the extraction of Kaempferol was found to be optimum pH at 6.0 and optimum concentrations was 20.5 µg/ml [9].

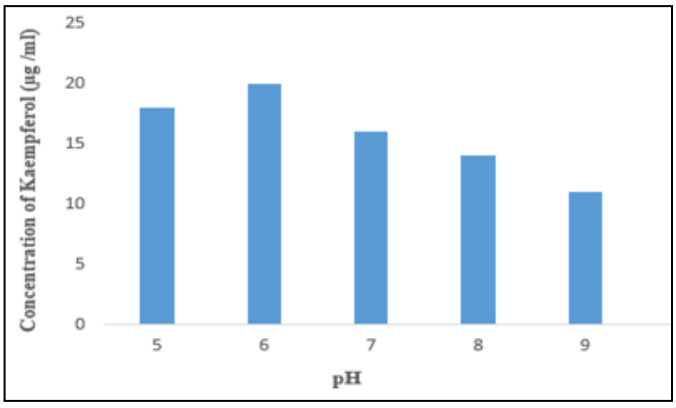

Fig 5: Effect of pH

5. **Effect of Extraction time:** The extract samples were incubated at various time intervals viz., 12, 24, 36 and 48 hours [10]. It was observed that the extraction of Kaempferol was found to be optimum time at 36 hours and optimum concentrations was 28.0 µg/ml.

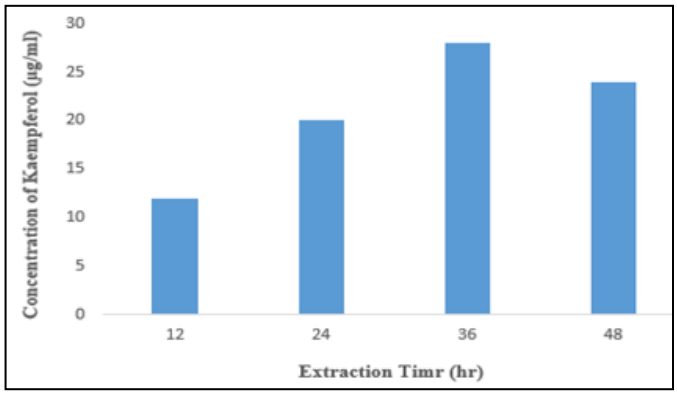

Fig 6: Effect of Extraction time

Discussion

In the research work, various parameters are used for the extraction of Kaempferol from the seeds of Cucurbita. The present optimization parameters like solvents, solvent percentages, particle size, pH and extraction time for the extraction of Kaempferol was studied. The highest concentration of Kaempferol was 28µg/ml. Solvent polarity plays a key role in increasing the phenolic solubility [6]. So methanol and has given the optimum yield of Kaempferol. In the solvent percentages, the higher concentration of Kaempferol was extracted with 80% methanol solvent from seeds of Cucurbita due to its higher polarity than remaining solvents [7]. Various particle size for extraction, the increasing of Kaempferol was due to increasing of contact surface area between material and solvent as well as increasing of diffusivity of material in a solvent [8]. Due to the inhibition of the enzymatic oxidation of phenolics, Kaempferol was shows low concentration values at pH [9]. Sometimes many plant tissues have a high enzyme actitvity that could affect degradation of phenolic components. The Kaempferol component is increased during the shorter time of extraction and decreases during the longest time of extraction [10]. The increased extraction time prospectively increases the loss of solvent by evaporization.

Conclusion

Mainly the Kaempferol is plays a antioxidant role characters and commonly found in plats. It shows various pharmacological activities. In this research work, for the extraction of Kaempferol, the optimum results were observed for the effects of different solvents, different solvent percentages, particle size, pH and extraction time for the extraction of Kaempferol were methanol, 0%, 125microns, 6.0 and 3 hours respectively. The highest Kaempferol concentration for optimized conditions was 28µg/ml.

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