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PROGRAM

WEDNESDAY - 27 August

	Hall A	Hall B
	Chairs: Zhengjin Jiang, Zeynep Altintas, Fabiana Arduini, Suna Timur	**Chairs:** Esen Bellur Atici, Gerhard Scriba, Guowang Xu, Zilin Chen
13.10-13.20	**YS-01** **Beril Sena Kaya** Molecularly Imprinted Electrochemical Sensor for Selective Determination of Paclitaxel in Complex Matrices: A Serum-to-Pharma Approach	**YS-02** **Vera Olicheva** Sequential HRMS Data Mining: Automated Data Ordering and TrendBased Ion Filtering
13.20-13.30	**YS-03** **Zeynep Aydemir** Development and Fabrication of a Molecularly Imprinted Polymer-Based Electrochemical Sensor for the Determination of Ivermectin	**YS-04** **Begum Demir** Development of HPLC Analysis Method For Tigecycline Loaded Formulation
13.30-13.40	**YS-05** **Ahmed Isa** Development of an Electrochemical Sensor Based on Molecularly Imprinted Polymers for Sensitive and Selective Detection of Pomalidomide	**YS-06** **Ayse Nur Buke** Micro-CT Analysis of 3D-Printed Chitosan Films: Evaluation of the Effect of Infill Pattern, Density, Layer Number and Crosslinking
13.40-13.50	**YS-07** **S. Irem Kaya** Exploring the Electrochemical Behavior of Vismodegib and Fabrication of a Selective MOF-MIP Sensor for Determination	**YS-08** **Armineh Deljavan Ghodrati** Development and Evaluation of BRAF Inhibitor Loaded Nanofiber Formulations for Targeted Therapy of Malignant Melanoma
13.50-14.00	**YS-09** **Seyda Nur Samanci** Electrochemical Fingerprinting of Abacavir Using a Nanomaterial Integrated Smart MIP Sensor with Enhanced Selectivity	**YS-10** **Tilbe Cevikelli** Development and Characterization of Mucoadhesive Buccal Films Containing Juniperus oxycedrus Extract
14.00-14.10	**YS-11** **Merve Yence** Indicator Displacement Assay for Opioid Analgesics	**YS-12** **Ayse Oktay** Selection of the Components using Van Krevelen and Hofzter Theory for the Rational Design of Fusidic Acid Nanoemulsions
14.10-14.20	**YS-13** **Ozum Ozoglu** Electrochemical Detection of Foodborne Escherichia coli with Pencil-Drawn Paper-Based Biosensors	**YS-14** **Setareh Dorreh** Molecularly Imprinted Polymer-Based Voltametric Sensor for Etoposide: A Smart Approach for Precise Chemotherapeutic Drug Detection
14.20-14.30	**YS-15** **Melike Akan** Development of Molecularly Imprinted Polymer-Based Electrochemical Sensor for Agromonitoring of Captan Detection in Apple Sample	**YS-16** **Hatice Demirtas** Formulation and Experimental Design-Based Optimization of Rosuvastatin Calcium-Loaded Lipid Nanoparticles

Development and Characterization of Mucoadhesive Buccal Films Containing *Juniperus oxycedrus* Extract

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Introduction

Mucoadhesive buccal films are emerging as a convenient drug delivery system that enhances bioavailability and avoids hepatic first pass metabolism, while providing local action and improving patient compliance. Such formulations typically contain natural polymers such as chitosan and sodium alginate, which are capable of forming uniform, mucoadhesive films suitable for buccal application. Chitosan, a positively charged polysaccharide, provides strong mucoadhesion and physical robustness, while sodium alginate, a negatively charged polymer, contributes to gel formation and flexibility [1,2]. As for the herbal component, *Juniperus oxycedru*s extract is one of the most widely studied herbal agents, traditionally used to treat throat infections and oral ulcers due to its proven antimicrobial and antiinflammatory properties. The objective of the present study was to design and characterize mucoadhesive buccal films containing *J. oxycedrus* extract, using different polymeric and plasticizer matrices (low molecular weight chitosan, medium molecular weight chitosan, sodium alginate and carboxymethyl cellulose (CMC) as polymers; glycerin (Gly) and propylene glycol (PG) as plasticizers). The films were evaluated in terms of thickness, weight, pH, mechanical strength, and organoleptic properties to assess their suitability for buccal application [2,3].

Materials and Methods

A total of 38 film formulations were prepared using the solvent casting technique, out of which 6 were selected for further characterization based on their organoleptic properties. Four types of film forming polymers were dissolved at different concentrations in distilled water, and mixed with a magnetic stirrer to reach a homogeneous suspension. Plasticizers Gly and PG were added at various ratios. Placebo formulations were cast in petri dishes and allowed to dry at room temperature. After drying, the films were cut into 4 cm^2 squares. Active formulations containing *J. oxycedrus* extract were prepared by incorporating the extract into the placebo formulations at a final concentration of 5 % (w/w), following the same casting and drying procedures. The extract was obtained by macerating air-dried, seedless fruits (20 g) in methanol (200 mL) at 50 °C under continuous shaking (700 rpm) for 8 hours in the dark, repeated twice. The combined extracts were filtered and concentrated using a rotary evaporator. All the chosen films were investigated and compared in terms of organoleptic parameters such as visual appearance, flexibility, homogeneity, adhering properties, and removal from petri dish. After removal of the films from the moulds, the film thickness was taken with the aid of a digital caliper at three randomly selected positions (n=3) on each film, and mean thickness ± standard deviation was determined. Homogeneity and reproducibility were checked by means of determining film weights with an analytical balance. Surface pH was measured by allowing 100 mg of each film to incubate in 10 mL of simulated salivary fluid (phosphate buffer, pH 6.8) for 4 h and then, measuring the pH of the medium. Mechanical properties such as tensile strength and elongation at break were assessed using texture profile analysis (TPA) [1,4].

Results and Discussions

A total of 38 buccal film formulations were prepared using various combinations of four film based polymers and two plasticizers. Based on organoleptic properties such as uniformity, flexibility, adhesiveness, and ease of removal, six formulations were selected for further physicochemical evaluation (Table 1). These formulations were analyzed in terms of film thickness, weight, and surface pH to assess their suitability for buccal application.

Table 1. Composition of Selected Buccal Film Formulations

Code	Polymer				Plasticizer		Juniperus oxycedrus extract	Distilled Water
	Low MW Chitosan	Medium MW Chitosan	CMC	Na Alginate	Gly	PG		
F1	2	-	-	-	10	-	5	qs 100
F2	2	-	-	-	-	10	5	qs 100
F3	-	2	-	-	5	-	5	qs 100

F4	-	2	-	-	-	5	5	qs 100
F5	-	-	5	-	5	-	5	qs 100
F6	-	-	-	4	5	-	5	qs 100

The thickness of placebo films ranged from 0.36 mm to 0.43 mm, while extract-containing films showed values between 0.37 mm and 0.46 mm. Although the addition of *J. oxycedrus* extract slightly increased film thickness, the difference between groups was not statistically significant ($p > 0.05$), indicating comparable structural consistency across formulations.In terms of weight, placebo films exhibited values between 0.10 g and 0.14 g, while *J. oxycedrus* extract loaded films ranged from 0.12 g to 0.16 g. The increase in film weight upon extract incorporation was found to be statistically significant ($p \leq 0.05$), suggesting that the inclusion of extract components contributed meaningfully to the overall formulation mass. pH values of placebo films ranged from 4.14 to 6.70, while those of extract-containing formulations ranged between 3.96 and 6.01. Despite a slight pH reduction observed in extract-loaded films, which was likely due to the acidic constituents of *J. oxycedrus*, the difference between groups was not statistically significant ($p > 0.05$). Importantly, all formulations remained within the physiologically acceptable pH range for buccal use. The mechanical strength and elasticity of the selected formulations were evaluated through peak load, deformation at break, tensile strength, and percentage elongation. Placebo films demonstrated a wide range of mechanical behavior depending on polymer type, with tensile strengths ranging from 0.02 to 0.23 N/mm² and elongation values between 26.3% and 153.6%. The *J. oxycedrus* extract loaded films showed tensile strengths from 0.02 to 0.17 N/mm² and elongation values ranging from 64.7% to 298.3%. Although some extract containing films, particularly F1 and F6, exhibited noticeable increases in flexibility and extensibility, statistical analysis revealed no significant differences between the placebo and extract groups in any of the evaluated mechanical parameters: peak load ($p > 0.05$), deformation ($p > 0.05$), tensile strength ($p > 0.05$), or elongation at break ($p > 0.05$). These results indicate that the incorporation of *Juniperus oxycedrus* extract did not significantly alter the mechanical integrity of the films. These findings demonstrate that while extract incorporation had a significant effect on film weight, it did not lead to undesirable changes in thickness, pH, or mechanical performance. The physical, chemical, and textural properties of the extract-loaded films suggest that they are structurally stable and potentially suitable for mucosal drug delivery applications [1,2,4].

Conclusion

This study successfully demonstrates the development and characterization of mucoadhesive buccal films incorporating *J. oxycedrus* extract using different natural polymer matrices and plasticizers. Of all the formulations studied, films of chitosan, sodium alginate demonstrated good combinations of mucoadhesive properties and film properties and among CMC films the maintaining of structure with moderate degree of film properties was observed. Film flexibility was significantly affected by the plasticizer type used, the glycerin based formulations generally had higher elongation at break. The addition of *J. oxycedrus* extract notably increased the weight of the film; however, it did not harm pH, thickness, and tensile strength. Of importance is that *J. oxycedrus* extract base films containing low molecular weight chitosan or sodium alginate, also presented improved elasticity, without sacrificing structural stability. F6 was one of the promising formulations since it had an ideal pH as well as high flexibility. These results imply the potential of the selected film compositions to be developed into a plant extract based buccal drug delivery system for local therapy in oral and oropharyngeal diseases.

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