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Applying Kinetic Spectrophotometric Method for Megestrol Drug with *Albizia Lebbeck Leaves*-capped AgNPs Sensor Synthesis in Urine and Blood Samples

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ABSTRACT

Megestrol drug is a synthetic steroid progesterone, and it is used as an anti-plasma agent to treat advanced breast cancer or endometriosis. Although the liquid chromatographic method for measuring megestrol has advantages such as excellent accuracy and reproducibility, it has limitations such as long-time measure, high equipment cost, and maintenance and use. In this study, for determination of megestrol drug in solution using kinetic spectrophotometric method, we prepared a solution of *Albizia Lebbeck Leaves*-capped AgNPs utilizing sodium borohydride as a stabilizer sensor. The calibration curve was linear in the range of (0.1 to 10.0 µg L^{-1}). The standard deviation of (3.0%), and detection limit of the method (0.2 µg L^{-1} in time 7 min, 385 nm) were obtained for Sensor level response *Albizia Lebbeck Leaves*-capped AgNPs with (95%) confidence evaluated. The observed outcomes confirmed the suitability recovery and a very low detection limit for measuring the megestrol drug. The method introduced to measure megestrol drug in real samples such as urine and blood was used and can be used for hospital samples. The chemical *Albizia Lebbeck Leaves*-capped AgNPs sensor made it possible as an excellent sensor with reproducibility.

Keywords: Megestrol Drug, *Albizia Lebbeck Leaves*-capped AgNPs, Sensor, Determination

1. INTRODUCTION

Drug delivery systems have been created for improving the therapeutic properties of the drugs and are often in form of a drug-containing capsule. Such systems release the drugs at a specific amount in a specific site, therefore they affect drugs' pharmacokinetics and distribution. Nanoparticles have been widely applied in drug delivery [1]. Determining the amount of drug used in the biological sample is very important to follow the amount of its effect in the body system. Accordingly, different methods with high sensitivity, selectivity and efficiency, as well appropriate analysis for the determination, extraction and measurement are presented of drugs in real samples [2]. Megestrol acetate, 17-

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(acetyloxy) -6-methyl-progen-4,6-din-3,20-dione show in (Fig. 1), a synthetic steroid progesterone, is widely used to treat loss of appetite and weight loss in AIDS patients [3]. Also, it is used as an anti-plasma agent to treat advanced breast cancer or endometriosis [4]. Mammography and other screening techniques, along with effective adjuvant therapies, have allowed most women with breast cancer to survive long and tumor-free [5]. Therefore, knowing the necessary care while following patients is of special importance. Cervical cancer is one of the most common malignancies in Iranian women after breast cancer [6]. Nowadays, surgery, chemotherapy and radiotherapy are known as the best way to treat breast cancer, but they all lead to hypoxia to varying degrees. It is necessary to target anti-cancer drugs so that they only affect cancer cells and also to use the minimum concentration of drugs so that the toxic effects of the drug on normal cells are reduced [7]. In that respect, for tracing one medicament in pharmaceutical and biological samples, numerous analytical techniques including capillary electrophoresis [8], nanocomposites electrodes-based voltammetry [9], high-performance liquid chromatography (HPLC) [10], liquid chromatography coupled with mass spectrometry (LC-MS) [11], and UV-visible spectrometric methods [12], have been utilized. Regardless of how time-consuming these techniques are yet, they need advanced instrumentation and are not fit for real-time analysis [13]. Lately, for discerning and accurate reorganization of species (1-inorganic 2- organic and 3- biomolecules) in different intricate matrices, attention has been drawn to noble metal nanoparticles-based UV–visible spectrometric methods [14].

Due to the profitable application of metal nanoparticles, technologies have taken advantage of nanoscale materials in a variety of fields from chemistry to medicine [15]. The forms, sizes, and structures of metallic nanomaterials which are extensively linked to their chemical, physical, and optical characteristics, set the ground for successful use of them in technologies. In this respect, the exceptional physical, chemical, and biological properties of silver nanoparticles (AgNPs) have been confirmed. This exceptionality arises from the size, form, composition, crystallinity, and structure of AgNPs in comparison with its bulk form [16]. AgNPs can by various methods such as the application of stabilizing and reducing chemicals of hydrate and sodium borohydride, formaldehyde, polyethylene glycol, glucose, electrochemical heating, photochemical reduction prepared [17]. Therefore, measures have been taken to investigate their exclusive properties and employ them in practical applications like anti-bacterial and anti-cancer therapeutics, diagnostics and optoelectronics, water disinfection, and other clinical/pharmaceutical applications [18]. Furthermore, AgNPs has been widely used in antimicrobial applications due to its antimicrobial properties. The exclusive properties of AgNPs have application in the fields of biosensing, nanomedicine, pharmacy, biomedical, detergents and determining environmental pollution caused by drugs in the ecosystem and biological samples equipment [19].

This study aimed to find a simple, fast and very sensitive method for identifying and measuring the drug megestrol by *Albizia Lebbeck Leaves*-capped AgNPs sensor. With an initial isolation method to measure this drug, various effective factors such as (pH, drug megestrol concentration, biosensor concentration, time reaction, etc.) on the response of the method and obtaining the optimal test values and obtaining the linear range, detection and

accuracy of the method presented in the measurement of megestrol drug as well as comparing the performance of the method with routine clinical techniques and checking the accuracy of the method and the identification and measurement of megestrol drug by a kinetic Spectrophotometric new method in real samples (blood serum) was checked. The chemical *Albizia Lebbeck Leaves*-capped AgNPs sensor made it possible as an excellent sensor with reproducibility, good recovery and a very low detection limit for measuring megestrol drug. The method by kinetic Spectrophotometric introduced to measure megestrol drug in real samples such as urine and blood was used and can be used for hospital samples.

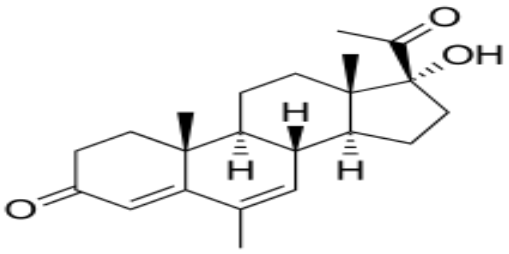

Figure. 1. The Structures of Megestrol Drug.

2. EXPERIMENTAL

2.1. Materials

Chemicals including Silver nitrate ($AgNO_3$) and Sodium borohydride ($NaBH_4$) were provided from Merck (Darmstadt, Germany). Megestrol medication (98.0%) was purchased from (Cipla, Indian Company). for pH < 7.0, as buffer solutions were prepared from 1 ml of boric acid/acetic acid/phosphoric acid (1.0 M), and for pH >7.0 was adjusted by the addition of 0.2M sodium hydroxide, DD H_2O (Double distilled water) was used in the preparation of the solutions.

2.2. Instrumentation

UV–vis spectrophotometer (Model UV–vis Shimadzu 180, Japan). The registration of FT-IR or Fourier transform infrared spectra were done on a PerkinElmer (FT-IR spectrum BX, Germany). SEM (Scanning electron microscopy: KYKY-EM 3200, Hitachi Firm, China) under an acceleration voltage of 26kV) was used to study the morphology of samples. TEM images (Transmission electron microscopy) were taken on a (TEM, JEOL, Hitachi Company, China). For the measurement of pH, the pH/Ion meter (model-728, Metrohm Firm, Switzerland, Swiss) was employed.

2.3. Pretreatment of real samples

In a 50 mL beaker, treatment of a 10 mL portion of a urine sample (or a spiked urine sample) in hospital (Esfahan, Shiraz, and Ahvaz) were done using 10 mL of concentrated HNO_3 (63%) and an $HClO_4$ (70%) mixture of 2:1 and then covered with a watch glass. Then on a hot plate, the treated sample of the balloon was heated (100°C 15 min/ 150°C 10 min). Next by removing the watch glass, the acid was left to evaporate to dryness at 150°C. After that by adding $HClO_4$ (3 mL) to the resulting white residue, the mixture was heated at 160°C to dryness. The whole heating process was done under a hood while necessary safety precautions were practiced. Upon adding five milliliters of 1 M H_2SO_4, the mixture was heated at 150°C for 1 min and then with the help of a 50 mL volumetric flask, the desired volume was made up to the mark. Seven mL of the obtained clear solution was picked and the analysis was performed according to the explained procedure [20].

Homogenized blood sample 20 mL was weighed accurately and in a 200 mL beaker was digested in the presence of an oxidizing agent with the addition of 10 mL concentrated HNO_3 and 2 mL $HClO_4$ 70 % were added and heated for 1 h. The content of the beaker was filtered through a whatman No. 42 filter paper into a 250 mL calibrated flask and its pH was adjusted to

the desired value and diluted to mark with de-ionized water. In all real and synthetic samples amount of megestrol drug was found by standard addition method [21].

2.4. Synthesis of Albizia Lebbeck Leaves-capped AgNPs

In this regard, the following details of the materials are important to consider in their synthesis: surface property, size distribution, apparent morphology, particle composition, dissolution rate. *Albizia Lebbeck Leaves*-capped AgNPs were prepared by the reduction of $AgNO_3$ with $NaBH_4$ as a modifier according to the method in the literature [22]. Briefly, 10.0 mL of *Albizia Lebbeck Leaves* (0.1 mM) solution was added into the reaction flask that contained 90.0 mL of $AgNO_3$ (0.1 mM) solution under vigorous stirring. After (15 min) was UV–visible spectrum of *Albizia Lebbeck Leaves*-capped AgNPs. Inset picture show *Albizia Lebbeck Leaves*-capped AgNPs. added into the above solution at room temperature and stirred for 1 h. The dark colloidal solution color was changed to bright yellow, confirming that the formation of *Albizia Lebbeck Leaves*-capped AgNPs. The *Albizia Lebbeck Leaves*-capped AgNPs solution was stored in the dark at ($4.0 \pm 2.0^{\circ C}$) to remain stable for several weeks (Fig. 2).

2.5. Procedure kinetic Spectrophotometric Detection measurements

The ensuing steps have been considered for a kinetic Spectrophotometric method experiment in the current study, at the initial step: Some of the sample solution containing 1 ml of megestrol drug (10.0 µg L^{-1}) was added to a 10 ml volumetric balloon. Then 1 ml of utilizing sodium borohydride as a stabilizer for sensor (2.0×10^{-2} mol L^{-1}) was added to the flask. Now, by increasing the first drop of 1 ml of *Albizia Lebbeck Leaves*-capped AgNPs solution (2.0×10^{-2} molL^{-1}) into a balloon, the reaction start time is recorded by a timer, after 5 seconds from the start of the reaction the solution is stirred for 30 seconds, Subsequently, an adequate amount of the solution was added to a 1 cm cell. Finally through using of UV–visible spectrum (AAb), the measurement of the difference between the quantities of the absorption in wavelength equal to (385.0 nm) in a time interval (1.0 -7.0 min) was carried out.

By adding megestrol medicament to the solution, it was observed that absorbance kinetic Spectrophotometric of the *Albizia Lebbeck Leaves*-capped AgNPs at the wavelength of (385.0 nm) dropped. At the same time, with the help of spectrophotometry and UV–visible

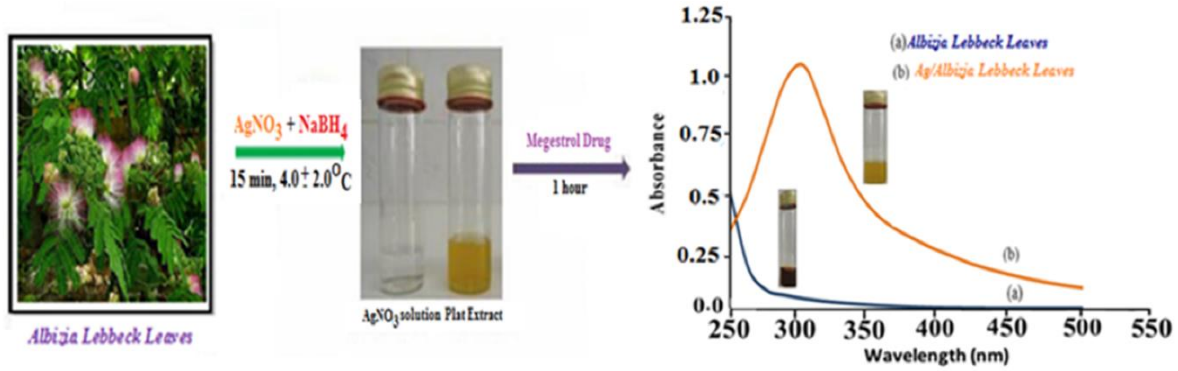

Figure. 2: Synthesis of *Albizia Lebbeck Leaves*-capped AgNPs.

spectrum (AAb), the apparent spectral evolution including the formation of a well-defined isobestic point at around (385.0 nm) was estimated. All reaction steps were repeated by increasing the concentration (2.0 µg L^{-1}) of the megestrol drug every 30 seconds. Moreover, the mentioned steps were repeated for a reaction in the absence of megestrol medicament (Abs b). Eventually, (Abs a) Abs blank – Abs sample was calculated. The reaction of the megestrol drug by *Albizia Lebbeck Leaves*-capped AgNPs was detected in the acidic medium in its wavelength (385.0 nm). Fig. 3A and 3B, demonstrate the absorption spectra in an aqueous solution [23].

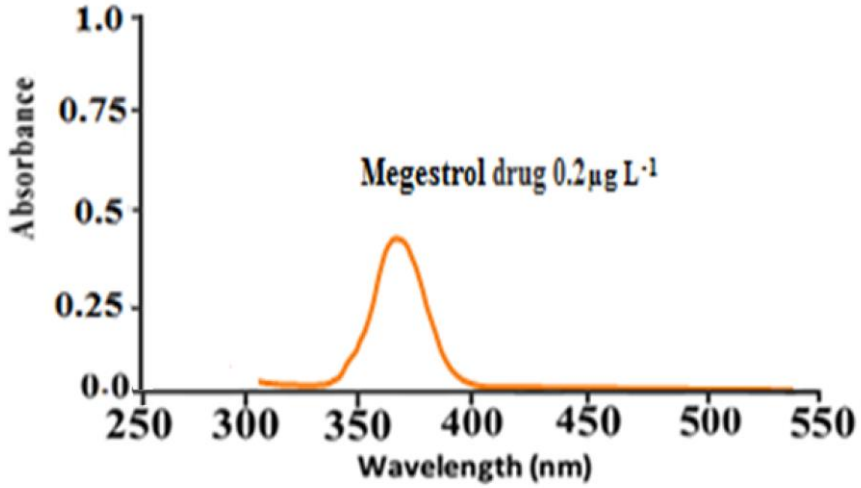

Figure. 3A: The sorption spectra reaction of result megestrol drug

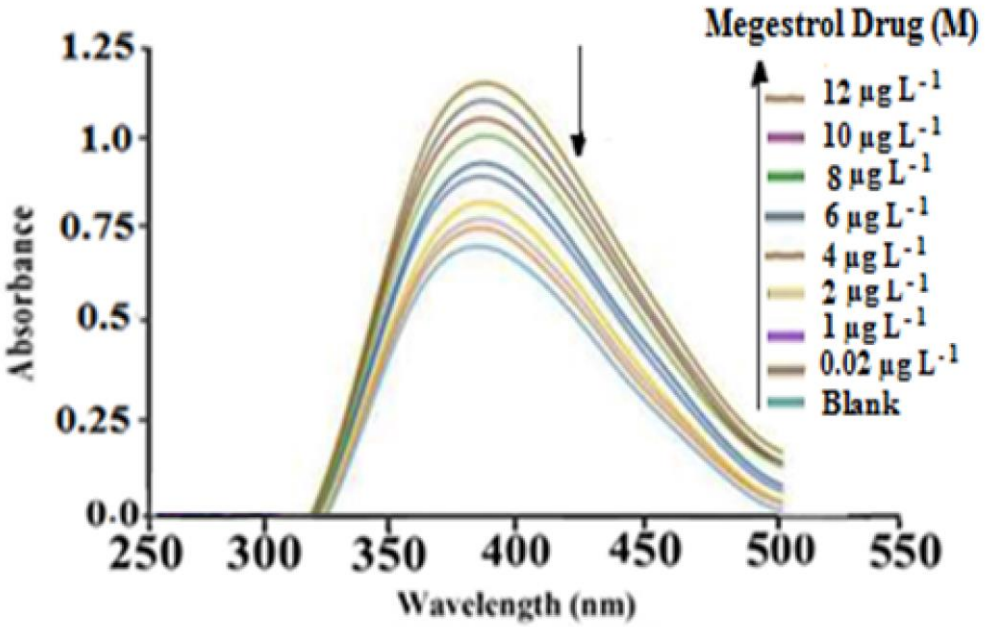

Figure. 3B: The sorption spectra of result *Albizia Lebbeck Leaves*-capped AgNPs and megestrol medicament solution (2.0 µg L^{-1}) at intervals time 30 s.

3. RESULT AND DISCUSSION

3.1. Characterization of sorbent

In (Fig.4a), the FTIR spectrum of activated carbon prepared from *Albizia Lebbeck Leaves*-capped AgNPs nanoparticles is shown. Additionally, the observed absorption signal at 3423 cm^{-1} points to O-H groups' presence because of the alcoholic or phenolic functional groups. Also, the presence of C-H groups is well proven by the signal observed at 2966 cm^{-1}. Correspondingly, the C=O active group's presence is confirmed by the signal observed at 1637 cm^{-1}. The signal at 996 cm^{-1} and 623 cm^{-1} is relevant to the Ag-O group of the *Albizia Lebbeck Leaves*-capped AgNPs nanoparticles. Scrutinizing these functional groups is of great consequence since complexation, or electrostatic attraction between the metal ions and varied surface oxygen-containing functional groups carried by the activated carbons lead to the elimination of heavy metals [24]. Different X-ray emission peaks are *Albizia Lebbeck Leaves*-capped silver nanoparticles. the adsorption of megestrol drug and based on (Fig.4b), which is the XRD pattern of the *Albizia Lebbeck Leaves*-capped AgNPs, the signals at 38.5 (122), 45.0 (111), 52.2 (200), 54.4 (231), and 72.7 (220) are ascribable to diffractions and reflections from the carbon atoms [25]. The perfect crystalline nature of the material was proven after functionalizing with *Albizia Lebbeck Leaves*-capped AgNPs however the great intensity of the signal at 45.0 (111) confirmed that there has been a slight amount of material in an amorphous state. The perfect synthesis of *Albizia Lebbeck Leaves*-capped AgNPs is obvious through looking at the XRD pattern. The morphological properties of the samples scrutinized by SEM are exhibited. By looking at (Fig. 4b), the smoothness, homogeneity, and tidiness of *Albizia Lebbeck Leaves*-capped AgNPs are confirmed. Even uniformity size distribution is observable in (Fig. 4c). After surface modification, the *Albizia Lebbeck Leaves*-capped AgNPs became uneven, larger, and bundled [25]. EDX (energy-dispersive X-ray spectroscopy) spectrum of (Fig. 4d) The EDX spectrum recorded from a film, after formation of silver nanoparticles. Different X-ray emission peaks are *Albizia Lebbeck Leaves*-capped AgNPs [26].

3.2. Optimization of decomposition

It would be interesting to know that in the presence of megestrol medicament, there observed a considerable improvement in the effectual colorimetric sensing and absorbance kinetic Spectrophotometric method of the as-prepared *Albizia Lebbeck Leaves*-capped AgNPs. Obtaining an exceptionally sensitive response in detecting megestrol medicament rests upon the systematic optimization of pH values, *Albizia Lebbeck Leaves*-capped AgNPs, and incubation time.

3.2.1. Effect of time on the reaction rate

A very important factor for measurements is the pH of the decomposition solution. To find the best pH for determining the megestrol medication (10.0 μg L^{-1}) with *Albizia Lebbeck Leaves*-capped AgNPs sensor (the pH range from 1 to 8, in 385 nm) were performed by method spectrophotometric kinetics for megestrol medicament was scrutinized (Fig.5) [27].

In this Study, the absorbance difference, in other words, the calculation of the difference between the absorbance of the *Albizia Lebbeck Leaves*-capped AgNPs and the absorbance of the compound megestrol medicament- *Albizia Lebbeck Leaves*-capped AgNPs at (385 nm) would lead to absorbance measurement, absorbance increased rapidly on changing

the pH from 1.0 to 4.0. This phenomenon might be because of the weak complexation at lower pH values (pH < 4.0). On the other hand, the reduced response of the proposed sensor for the determining megestrol medicament at pH > 4.0 could be due to a possible formation of the hydroxide of megestrol medicament in solution. Thus, pH 4.0 was selected as a favorable pH for all subsequent experiments [28].

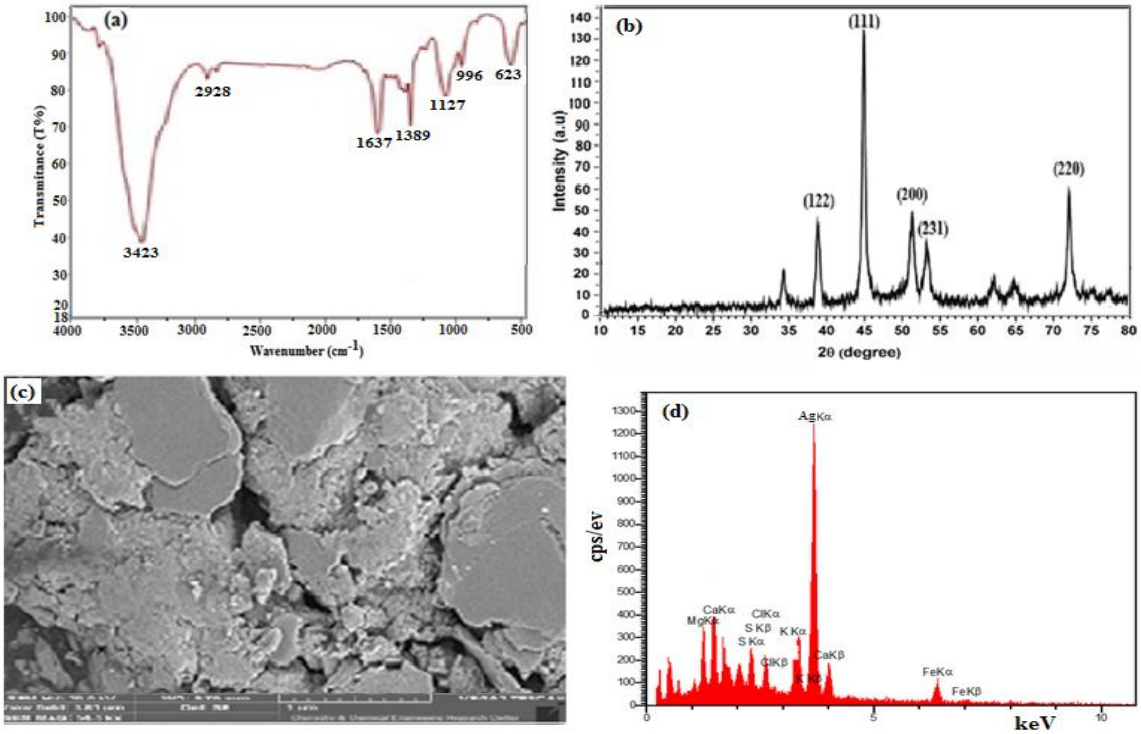

Figure. 4: (a) FTIR spectra of the prepared *Albizia Lebbeck Leaves* (b) The (XRD) image of the prepared *Albizia Lebbeck Leaves*-capped AgNPs. (c) The (SEM) image of the prepared *Albizia Lebbeck Leaves*-capped AgNPs. (d) EDX spectrum recorded from a film, after formation of silver nanoparticles. Different X-ray emission peaks are *Albizia Lebbeck Leaves*-capped AgNPs.

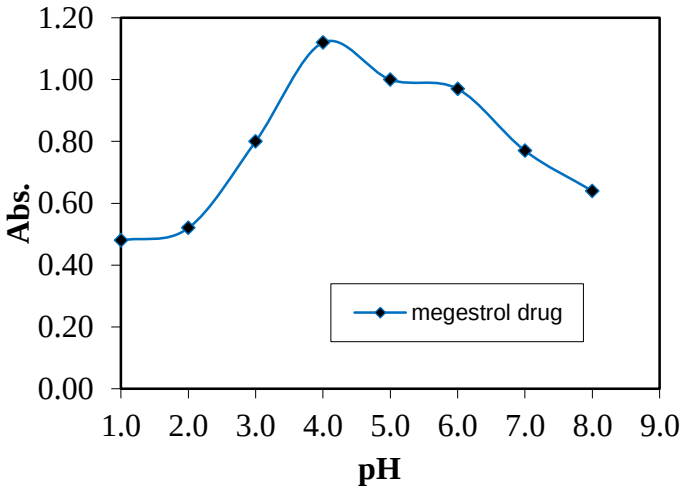

Figure. 5: Effect of pH on the reaction rate. (aqueous sample volume, 10 mL: *Albizia Lebbeck Leaves*-capped AgNPs, 2.0×10^{-2} M, sodium borohydride, 2.0×10^{-3} M, megestrol drug = 10.0 μgL^{-1}, time 7 min, 385 nm).

3.2.3. Effect of Albizia Lebbeck Leaves-capped AgNPs on the reaction rate

To scrutinize the efficacy of *Albizia Lebbeck Leaves*-capped AgNPs sensor on the reaction rate, 1 ml, *Albizia Lebbeck Leaves*-capped AgNPs (0.5×10^{-3} to 1.5×10^{-2} mol L^{-1}) along with 1 ml megestrol medicament (10.0 μg L^{-1}) solution, 1 ml of utilizing sodium borohydride as a stabilizer for sensor (2.0×10^{-3} mol L^{-1}) and buffer acetic acid/ acetate (1.0 M) to adjust the pH solution, pH=4, in 385 nm) After (7.0 min), the calculation of the difference between the sorbance of the *Albizia Lebbeck Leaves*-capped AgNPs and the absorbance of the compound megestrol medicament-*Albizia Lebbeck Leaves*-capped AgNPs at (385 nm) was scrutinized sorption of solution was estimated. As demonstrated in (Fig.7), and by considering the results, the preferred concentration was selected to be *Albizia Lebbeck Leaves*-capped AgNPs sensor (2.0×10^{-2} mol L^{-1}).

3.2.4. Effect of sodium borohydride concentration on the reaction rate

To scrutinize the efficacy of sodium borohydride on the reaction rate, 1 ml sodium borohydride (0.05 to 3.0×10^{-3} mol L^{-1}) along with 1 ml megestrol medicament (10.0 μg L^{-1}) , buffer acetic acid/ acetate (1.0 M) to adjust the pH solution and 1 ml *Albizia Lebbeck Leaves*-capped AgNPs (2.0×10^{-2} mol L^{-1}, pH=4, in 385 nm) After (7.0 min), the calculation of the difference between the sorbance of the *Albizia Lebbeck Leaves*-capped AgNPs and the absorbance of the compound megestrol medicament- *Albizia Lebbeck Leaves*-capped AgNPs at (385 nm) was scrutinized sorption of solution was estimated. As demonstrated in (fig.8), and by considering the results, the preferred concentration was selected to be sodium borohydride (2.0×10^{-3} mol L^{-1}).

3.3. Analytical specifications and Calibration graph and reproducibility

After optimizing the factors affecting the measurement of megestrol, the grading curve was plotted under optimized conditions (Fig. 9). As shown the adsorption intensity in the range of megestrol medicament (0.01-10.0 μg L^{-1}), is linearly related to the concentration of megestrol drug, and this error follows the equation y = 0.0493x + 0.0605, where is the concentration megestrol drug x (μgL^{-1}), is equal to 0.9960 in terms of molar and correlation (R^2).

Also, for 6 replicates, measurement of megestrol drug (10.0 μg L^{-1}), solution with optimized conditions, he relative standard deviation (R.S.D) for the response of *Albizia Lebbeck Leaves*-capped AgNPs towards a (10.0 μg L^{-1}) of megestrol medicament was (3.0%) and reproducibility of the response of different *Albizia Lebbeck Leaves*-capped AgNPs was also studied. The determination of (10.0 μg L^{-1}) megestrol drug. The relative standard deviation for the response of between membranes was (0.2 μg L^{-1}) (Fig. 9) [30].

3.4. Optimum values of parameters

The optimum values of parameters are demonstrated in Table.1. The method can be used as an alternative method for megestrol medicament measurement owing to advantages like excellent selectivity and sensitivity, low cost, simplicity, low detection limit and no need in utilizing organic harmful solvent.

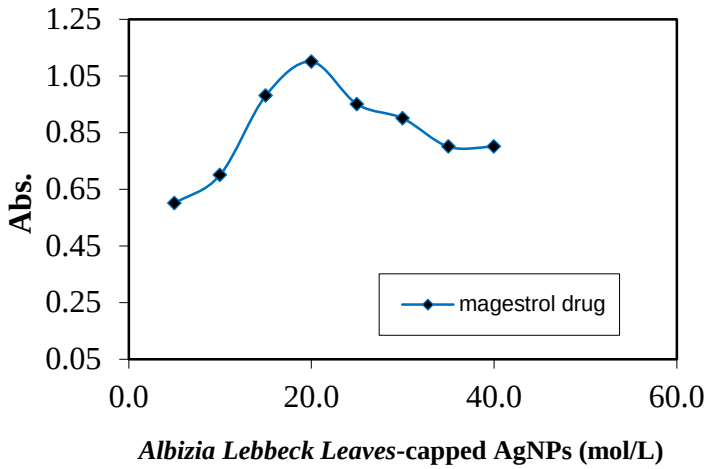

Figure. 7: Effect of *Albizia Lebbeck Leaves*-capped AgNPs on the reaction rate. (aqueous sample volume, 10 mL: Sodium borohydride, 2.0×10^{-3} M, megestrol drug = 10.0 μgL^{-1}, pH =4, time 7 min, 385 nm).

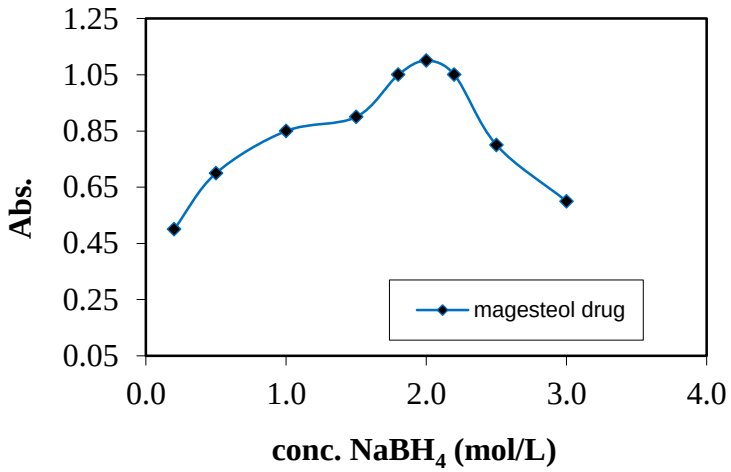

Figure. 8: Effect of Sodium borohydride on the reaction rate. (aqueous sample volume, 10 mL: *Albizia Lebbeck Leaves*-capped AgNPs, 2.0×10^{-2} M, megestrol = 10.0 μgL^{-1}, pH =4, time 7 min, 385 nm).

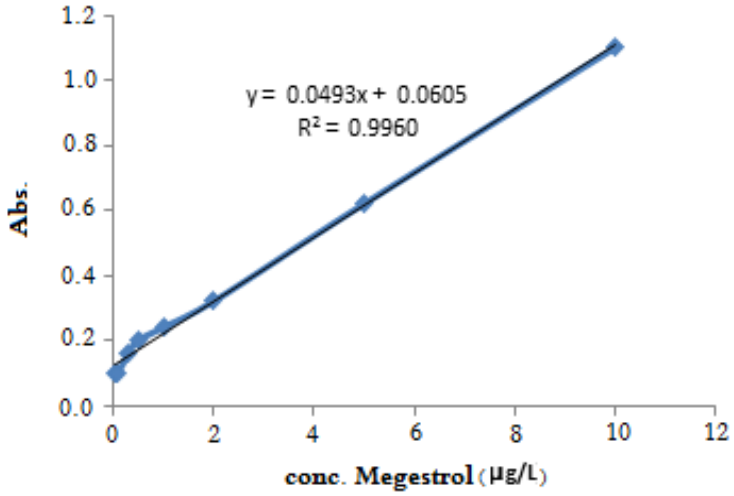

Figure. 9: Calibration graph for megestrol medicament.

Table 1. Investigation of method repeatability at conditions

Parameter	Optimum Value for megestrol drug
megestrol drug (M)	(10.0 μg L^{-1})
Albizia Lebbeck Leaves-capped AgNPs (M)	(2.0×10^{-2} M)
concentration $NaBH_4$(M)	(2.0×10^{-3} M)
pH	4.0
Equilibration time (min)	(7.0 min)
Linear range (mol L^{-1})	(0.01-10.0 μg L^{-1})
Detection limit (molL^{-1})	(0.2 μg L^{-1})
Accuracy and precision	High
Advantages	High repeatability, sensitivity, selectivity, wide linear range and no need to organic solvent

3.5. Interference Studies

After establishing the measurement method, to evaluate the selectivity of the prepared *Albizia Lebbeck Leaves*-capped AgNPs sensor for determining the megestrol medication, the effect of the interaction of different other medications, molecules and ions in determining the megestrol medication was investigated. The considered limit was considered as the concentration of the annoying species that caused the change intensity of analyte adsorption, more than (5%) of the initial value. To determine the degree of Interference of each species in the measurement of (10.0 μg L^{-1}) solution of megestrol medication, so much was added to this solution of the disturbing species that its absorption intensity changed by 5% compared to the initial absorption intensity [31]. The results are shown in (Table.2).

The results showed that most of the other medications studied did not have much effect on the measurement of megestrol drug and among them, compounds with a more similar structure or with more functional groups are more disturbing, which It may be related to their hydrogen interactions or the molecule of the megestrol drug and thus reduce the measurement of the megesterol medication in the analyte sample. As exhibited in (Table.2), the tolerance limit was determined as the max concentration of the interfering substance which resulted in an error less than (±5%) for determination of megestrol medicament. The So selectivity of the recommended method was proven.

Table 2. Impacts of the matrix medicaments on the retrieving of the examined megestrol drug (N=6).

Drugs	Tolerance limit (ng/mL)
Amoxicillin, Ampicilline, Acetominophene, Cortisone, Cyclosporine	1000
Naratriptan, Rizatriptan, Sumatriptan, Zolmitriptan	500
Tramadol, Methadone	100

3.6. Application of the real sample

In order to evaluate the efficiency of the proposed sensor for determining megestrol drug in real samples, this *Albizia Lebbeck Leaves*-capped AgNPs sensor was used to measure megestrol medication in urine and blood human samples according to the instructions mentioned for megesterol medication experiment 3 replicates measuring section [32]. The obtained percentage percentiles in (Table.3), indicate that the prepared sensor has a very good performance for determining the drug megestrol medication in urine and blood human samples. Therefore, In all real and synthetic sample amount of megestrol drug was found by standard addition method. The level of the megestrol medicament

was estimated to be below the detection limit of related element. Based on the outcomes of replicating analyses for each sample, it was shown that the medication retrievals were mainly quantitative with a low RSD. The potentiality of the recommended method for the determination of trace quantities of these elements in distinct samples was proven.

4. CONCLUSION

The investigation in this article focused on measuring the amount of trace megestrol medicament utilizing *Albizia Lebbeck Leaves*-capped AgNPs sensor, in the company of utilizing sodium borohydride as a stabilizer sensor. A successful analytical method for measuring megestrol medicament was prosperously developed via utilizing a sensitized spectrophotometric with the help of *Albizia Lebbeck Leaves*-capped AgNPs. The method can be used as an alternative method for megestrol medicament measurement owing to advantages like excellent selectivity and sensitivity, low cost, simplicity, low detection limit and no need in utilizing organic harmful solvent or extraction.

The reaction was evaluated by measuring the absorption rate of megestrol drug, the optimum conditions. For determination megestrol drug in solution we used a prepared from *Albizia Lebbeck Leaves*-capped AgNPs of utilizing sodium borohydride as a stabilizer sensor synthesis and kinetic spectrophotometric method. The calibration curve was linear in the range of (0.01 to 10.0 μg L^{-1}). The standard deviation of (3.0 %), and detection limit of the method (0.2 μg L^{-1} in time 7 min, 385 nm) were obtained for Sensor level response *Albizia Lebbeck Leaves*-capped AgNPs with (95.0 %) confidence evaluated. The lowest determining error megestrol drug could be obtained in a short time, which strongly confirms the greater contribution for the deletion of megestrol drug by *Albizia Lebbeck Leaves*-capped AgNPs sensor.

On the other hand, some of advantages for this work are listed below:

(I) Fast and clean synthesis without the use of hazardous, toxic and dangerous compounds or surfactants.

(II) The use of sodium borohydride extract as an economic and effective reducing and stabilizing agent.

Table 3. Retrieval of trace megestrol medicament from urine and blood samples after applying presented procedure (N=3).

Samples	Added (μg L^{-1})	Founded (μg L^{-1})	RSD %	Recovery %
Urine hospital Esfahan	0.0	7.1	1.1	----
	5.0	12.0	1.2	98.0
Blood hospital Esfahan	0.0	4.8	1.1	----
	5.0	10.0	1.4	104.0
Urine hospital Shiraz	0.0	1.9	3.7	----
	5.0	7.0	2.8	102.3
Blood hospital Shiraz	0.0	12.1	3.8	----
	5.0	17.0	3.0	97.7
Urine hospital Ahvaz	0.0	4.3	2.3	----
	5.0	9.4	1.8	102.2
Blood hospital Ahvaz	0.0	6.1	2.5	----
	5.0	11.2	2.1	101.7

(III) The use of waste *Albizia Lebbeck Leaves*-capped AgNPs sensor as a natural and inexpensive valuable resource and environmentally benign support.

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استفاده از روش اسپکتروفتومتری جنبشی برای تعیین دارو مجسترول توسط سنسور سنتزی نانو ذرات نقره پوشیده شده با عصاره برگ گیاه گل ابریشم در نمونه‌های خون و ادرار و خون

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چکیده

داروی مجسترول یک استروئید مصنوعی پروژسترون است و به عنوان یک عامل ضد پلاسما برای درمان سرطان پیشرفته پستان یا اندومتریوز استفاده می‌شود. اگرچه روش کروماتوگرافی مایع برای اندازه‌گیری مگسترول دارای مزایایی مانند دقت و تکرارپذیری عالی است، اما محدودیت‌هایی مانند اندازه گیری طولانی مدت، هزینه بالای تجهیزات و نگهداری و استفاده دارد. در این مطالعه، برای تعیین داروی مگسترول در محلول با استفاده از روش اسپکتروفتومتری جنبشی، ما یک محلول از نانوذرات نقره پوشیده از برگ گیاه گل ابریشم با استفاده از سدیم بوروهیدرید به عنوان سنسور تثبیت کننده تهیه کردیم. منحنی کالیبراسیون در محدوده (۰,۱ تا ۱۰,۰ میکروگرم در لیتر) خطی بود. انحراف استاندارد (۳,۰ درصد)، و حد تشخیص روش (۰,۲ میکرو گرم در لیتر، در زمان ۷ دقیقه، ۳۸۵ نانومتر) برای پاسخ سطح حسگر از نانوذرات نقره پوشیده از برگ گیاه گل ابریشم با (۹۵)) اطمینان ارزیابی شد. نتایج مشاهده شده بازیابی مناسب بودن و محدودیت تشخیص بسیار کم برای اندازه گیری داروی مگسترول را تأیید کرد. از روش اندازه گیری داروی مگسترول در نمونه‌های واقعی مانند ادرار و خون استفاده شد و می‌توان از آن برای نمونه های بیمارستانی استفاده کرد. حسگر شیمیایی از نانوذرات نقره پوشیده از برگ گیاه گل ابریشم این امکان را به عنوان یک سنسور عالی با قابلیت تکرارپذیری فراهم کرد.

کلید واژه‌ها: داروی مجسترول، اسپکتروفتومتری جنبشی، حسگر، نانوذرات نقره، برگ گیاه گل ابریشم

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