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Dedication

With the help of GOD, the Almighty, I dedicate this modest work to those without whom nothing would have been possible.

To you we dedicate the fruits of our success after all the hard work and struggle to the noble figure and outstanding character, my dear father **Seddik**

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Nawal





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Chahira

Abstract

In the urinary system, urolithiasis is the most prevalent disorder which causes severe pain in individuals. Urinary stones are composed of calcium oxalate (CaOx) and calcium phosphate in approximately 80% of patients. Although various drugs and surgery operations are used to treat the disease, side effects of drugs and the high recurrence after therapy in patients cannot be ignored. Increasing incidence of the stone formation associated with inflammation and severe pain, the demand of medicinal plant treatement have gained more attention in preventing a suffering from lithiasis. The various herbal plants extract consist of active phytoconstituents like flavonoids, alkaloids, saponins, strerols possesses an bioactivity like diuretic, ant-inflammatory, analgesic and anti-oxidant property. The current study emphasizes the understanding pathology of the stone formation and traditional used medicinal plants as an alternative complementary therapy with less side effects. In addition, the study has also put an effort to summarize mechanisms of various herbal plants in the management of urolithiasis and providing a future investments and direction in developing plant based treatment for urolithiasis.

Key words: urolithiasis, Urinary stones, drugs, medicinal plants, phytoconstituents.

Résumé

Dans le système urinaire, la lithiase urinaire est le trouble le plus répandu qui cause une douleur sévère chez les individus. Les calculs urinaires sont composés d'oxalate de calcium (CaOx) et de phosphate de calcium chez environ 80% des patients. Bien que divers médicaments et interventions chirurgicales soient utilisés pour traiter la maladie, les effets secondaires des médicaments et le taux élevé de récidive après le traitement chez les patients ne peuvent être ignorés. En raison de l'augmentation de l'incidence de la formation de calculs associée à l'inflammation et à la douleur sévère, la demande de traitement par les plantes médicinales a attiré plus d'attention pour prévenir les souffrances liées à la lithiase. Les divers extraits de plantes médicinales contiennent des phytoconstituants actifs tels que les flavonoïdes, les alcaloïdes, les saponines, les stérols, qui possèdent une bioactivité comme diurétique, anti-inflammatoire, analgésique et antioxydante. L'étude actuelle met l'accent sur la compréhension de la pathologie de la formation des calculs et sur l'utilisation traditionnelle des plantes médicinales comme thérapie complémentaire alternative avec moins d'effets secondaires. De plus, l'étude a également tenté de résumer les mécanismes des diverses plantes médicinales dans la gestion de la lithiase urinaire et de fournir des investissements futurs et des orientations dans le développement de traitements à base de plantes pour la lithiase urinaire.

Mots-clés : lithiase urinaire, calculs urinaires, médicaments, plantes médicinales, phytoconstituants.

الملخص

يُعد تكوّن الحصى في الجهاز البولي (تحصي البول) أكثر الاضطرابات شيوعًا، مما يسبب ألمًا شديدًا لدى الأفراد. تتكون حصى البول من أكسالات الكالسيوم (CaOx) وفوسفات الكالسيوم في حوالي 80% من المرضى. وعلى الرغم من استخدام العديد من الأدوية والعمليات الجراحية لعلاج المرض، إلا أن الآثار الجانبية للأدوية وارتفاع معدل التكرار بعد العلاج في المرضى لا يمكن تجاهلهما. وبسبب زيادة حدوث تكوّن الحصى المرتبط بالالتهاب والألم الشديد، زاد الاهتمام باستخدام العلاج بالنباتات الطبية في الوقاية من التحصي. تتكون مستخلصات النباتات العشبية المختلفة من مكونات نباتية نشطة مثل الفلافونويدات، والقلويدات، والصابونينات، والستيرولات التي تمتلك نشاطًا حيويًا مثل المدّر للبول، والمضاد للالتهابات، والمسكّن، والمضاد للأكسدة. تؤكد الدراسة الحالية على فهم آلية تكوّن الحصى واستخدام النباتات الطبية التقليدية كعلاج تكميلي بديل مع آثار جانبية أقل. بالإضافة إلى ذلك، تسعى الدراسة إلى تلخيص آليات عمل النباتات العشبية المختلفة في إدارة تحصي البول وتوفير اتجاهات استثمار مستقبلية في تطوير علاج نباتي لتحصي البول.

الكلمات المفتاحية: تحصي البول، حصى البول، الأدوية، النباتات الطبية، المكونات *النباتية*.

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List of Abbreviations:

ESWL	Lithotripsy
PCNL	Percutaneous nephrolithotomy
GFR	Glomerular filtration rate
SNGFR	Single nephron glomerular filtration rate
PCT	Proximal convoluted tubule
Na+ K+ ATPase pumps	Sodium Potassium pumps
ACE	Angiotensine converting enzyme
AⅡ	AngiotensineⅡ
PG	Prostaglandins
EPO	Erythroproietin
HCO3-	Bicarbonate ion
ADH	Antidiuretic hormone
RAAS	Renin-Angiotensin-Aldosterone system
BP	Blood pressure
CaOx	calcium oxalate
BC	Biforechrist
CD44	Cluster of differentiation 44
HA	hyaluronan
HSP90	heat shock protein 90
OPN	osteopontin
MgNH4PO4·6H2O	magnesium ammonium phosphate
CaP	calcium phosphate
UTIs	urinary tract infections
spp	Species pluralis
SLC3A1	Solute carrier family 3 menber
HIV	Human immunodeficiency virus
KSD	kidney stone disease
URS	ureteroscopy

COX2	cyclooxygenase-2
CaC2O4	Calcium oxalate
ROS	reactive oxygen species
RNS	reactive Nitrogen Species
H2O2	hydrogen peroxide
O2·−	superoxide
·OH	hydroxyl
NO·	nitric oxide
ONOO−	peroxynitrite
SOD	superoxide dismutase
CAT	catalase
GSH	reduced glutathione
OS	oxidative stress
NADPH oxidase	Nicotinamide adenine dinucleotide phosphate oxidase
NOX1-5	NADPH oxidase family ofenzymes (1-5)
DUOX1, DUOX2	Dual oxidase (1-2)
ETC	electron transport chain
O2	oxygen
COM	Cystine crystals monohydrate
CaP	Calicium phosphate
UA	Uric acid
MCP-1	Monocyte chemoattractant protein-1
IL-6	Interleukin-6
DNA	Deoxyribonucleic acid
8-OHdG	8-hydroxy-2'-deoxyguanosine
mRNA	Ribonucleic acid
NF-κB	Nuclear factor kappa B
Zn	zinc
GPO	glutathione peroxidase
GST	Glutathione S-transferase
PKC	Protein kinase C

JNK	c-jun N-terminal kinase
p38-MAPK	p38 mitogen activated protein kinase
AP-1	Activator protein-1
OPN	osteopontin
EGCG	Epigallocatechin gallate
MgCit	Magnesium Citrate
MgHCit	Magnesium Hydrogen Citrate
MgC2O4	Magnesium oxalate
MDA	Malondialdehyde
GPx	Glutathione peroxidase
α-SMA	Alpha smooth muscle action
Nrf2	Nuclear factor erythroid 2-related factor 2.
HO-1	Heme oxygenase-1
NQO1	Quinone oxidoreductase 1
UGT	UDP-glucuronosyltransferase.
cGMP	Cyclic guanosine monophosphate
NSAIDs	Nonsteroidal anti-inflammatory drugs
ATP	Adenosine triphosphate