International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 6 Nov-Dec 2022, pp: 841-848 www.ijprajournal.com ISSN: 2456-4494

Role of natural subastance and medicinal vegetation in antioxidant ability.

Ritu Rina Sinha, Dr. Mukesh kumar Gupta
Faculty of Pharmacy, Lords University, Alwar Bhiwadi Road, Chikani, Rajasthan.

Submitted: 15-11-2022 Accepted: 26-11-2022

Medicinal vegetationhasconstantly been taken into consideration as acrucialsupply of wholesomelifestyles for people and animals. Therapeutic homes of scientificvegetation are very beneficial in remedy of numerousillnesses [1]. In many components of the world, medicinal vegetationhad been used for his or her antibacterial, antiviral and antifungal sports for massesof years [2-3]. Researchers are an increasing number of turning their wondering to herbalmerchandise and seeking out new ends inincreasehigherpillstowardsmost cancers, viral and microbial infections [3-4]. Several artificial antibiotics are used withinside theremedy of infections and communicable illnesses. The dangerous microorganisms may be inhibited with pills and this has resulted withinside the emergence of a couple of drug resistant micro organism and it has produced alarming scientificconditionswithinside theremedy of infections. Bacteria have the genetic capacity to transmit and accumulate resistance to artificialpills, which can be used as healingretailers [5-6]. So, movesneed to be taken to reduce this problem, along with to much lessutilization of antibiotics, growing new pills to save you resistance amongst microorganism [7-8]. 10 Antimicrobial researches have proven that better resistance in Gram-badmicro organism and decrease resistance in Gram-tremendousmicro organismdue to the variantwithinside themobile wall systems of Gram-tremendous and Gram-badmicro organism. More specially, Gram-badmicro organism has an outer membrane this is contained of excessive-density lipopolysaccharides that function a barrier to numerous environmental materialsinclusive of antibiotics [8-9]. Although hundreds of plant species had beenexamined for antimicrobial homes, maximum of them have now no longer been competently evaluated [10]. The Indian plant lifegivesfirst-rateopportunities for the inventionof recentdrug treatments having crucial medicinal packages in preventingcontamination and strengthening the immune gadget. The antimicrobial molecules determined in vegetationsave you bacterial infections throughexclusive mechanisms than the economic antibiotics. Therefore, the medicinal vegetation have scientificprice in treating resistant microorganism lines. Many bacterial pathogens swiftlyturn out to beproof againstsome ofat the startobserved antimicrobial pillsdue to indiscriminate use of antibiotics. This may be verycrucialdue to the fact Pseudomonas aeruginosa, Escherichia coli and Staphylococcus aureus are a number of the crucial human pathogens which haveadvanced resistance to antimicrobials.

Role of antibiotics in bacterial remedy

Antibiotics are very crucial of bacterial remedy [11]. The purposeof thosepills is to kill the invading micro organismwithout harming the host. Antibiotic effectiveness relies upon on mechanism of motion, immune repute of the host, resistance elements of micro organism, drug distribution and placement of contamination [12]. Eleven Antibiotics paintingsthrunumerous mechanisms. Some antibiotics inhibit formation of bacterial mobile walls. Erythromycin, chloramphenicol and tetracycline interrupt protein synthesis. Still a few others inhibit bacterial metabolism (sulfa pills) or intrude with DNA synthesis (ciprofloxacin, rifampin) and/or mobile membrane permeability (polymyxin b) [13]. When antibiotics have beenobservedwithinside the 1930s, they have beenpowerful in bacterial contaminationremedy. In later of years, due togrowingmicroorganism's drug resistance, many antibiotics have misplaced effectiveness towardsnot unusualplace bacterial infections [14, 15]. Bacteria may alsoobviouslyturn out to beproof againstexclusivelessons of antibiotics or may alsoattain resistance from differentmicro organismthrutrade of resistant genes. Prolonged, beside the point and indiscriminate use of antibiotics havedecided on out the maximum antibiotic-resistant micro organism [16]. Antibiotic-resistant lines have

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 6 Nov-Dec 2022, pp: 841-848 www.ijprajournal.com ISSN: 2456-4494

emerged in hospitals, long-time period care centers and groups worldwide [17].

Human pathogenic microbes Microorganisms are very various. Their exclusive cells appearancefurther in morphology and bringcomparable colonies. It will becomecrucial to become aware of the organisms through their biochemical traits i.e., supportingto categorise the organisms, growingillnesses that kill people, animals and vegetation.

Bacillus cereus is a gram-tremendous, rod-shaped, aerobic, facultatively anaerobic, motile, β-hemolytic bacterium usuallydetermined in soil and meals. Some lines are dangerous to people and purpose foodborne illness, even asdifferentlinesmay be 12 useful as probiotics for animals [18, 19]. It is the purpose of "fried rice syndrome", because themicro organism are classically shrunk from fried rice dishes which have been sitting at room temperature for hours [20, 21].

Staphylococcus aureus is a not unusualplace colonizer of human pores and skin and mucosa. S. aureus can purposeailment, specially, if there'sanpossibility for the micro organismto go into the frame [22]. S. aureus is the maximumcrucial human staphylococcal pathogen. It reasons abscesses, pneumonia, wound infections, boils and poisonoussurprise syndrome amongdifferentillnesses. Most lines of this bacterium are touchy to many antibiotics, and infections may beefficaciouslyhandled [23].

Escherichia coli are commonlydeterminedwithinside the gastro-intestinal tracts of warm-blooded organisms. The maximumnot unusualplacepurpose of urinary tract contamination in people is E. coli, inflictingat the least5varieties of gastro-intestinal illnesses in people. Pathogenic lines are commonlydiagnosedthrough detection of particular virulence elements or of a serotype related to a virulence factor [24]. E. coli is anrisingpurpose of meals-borne contaminationwhich ends up in bloody diarrhoea and sometimes to kidney failure. E. coli contaminationalso canarise after consuminguncooked milk and after swimming or consuminginfected water [25].

Pseudomonas aeruginosa is an opportunistic pathogen and exploits a fewdamagewithinside the host defenses to provokeancontamination. The microorganism found in water and soil and is infamous for its resistance to antibiotics. Therefore, a speciallyrisky and dreaded pathogen. The bacterium is obviouslyproof against many antibiotics because of the impermeability traits of the outer membrane. Thirteen Moreover, its tendency to colonize surfaces in a biofilm shape makes the cells impervious to healing concentrations of antibiotics [26].

Fusarium oxysporum Some microorganism may alsopurposequite a number opportunistic infections in people. In people with everyday immune structures, fusarial infections may alsoarisewithinside the nails and withinside the cornea. In people, whose immune structures are weakened in a selectedmanner, (neutropenia may be very low neutrophils count), competitive fusarial infections penetrating the completeframe and bloodstream can bedue toindividuals of the Fusarium solani complicated, Fusarium oxysporum, fusarium verticillioides, fusarium proliferatum and seldomdifferent fusarial species [27].

Aspergillus niger species are sometimesaccountable for otomycosis, a superficial scaly contamination of the pores and skin of outside auditory meatus. Aspergilli are not unusualplace contaminants, a prognosis of aspergillosis must be made bestwhile the organisms had beenagain and againremoted and whilefurther, it has now no longer been viableto illustrateanother pathogen. Aspergillus nigerconfirmed black coloured colonies on Sabouraud's dextrose agar. It reasons a ailmentknown as "black mold" on sureend result and greensalong with grapes, apricots, onions, and peanuts, and is a not unusualplacemeals contaminant. Aspergillus nigerreasons very much less human ailmentevaluate to the alternativeaspergillus species. Aspergillosis is commonamongst horticultural employees who inhale peat dust, which may bewealthy in aspergillus spores. It has been determinedwithinside the mummies of historic Egyptian tombs and may be inhaled whilethey're disturbed [28].

Antioxidant ability of medicinal vegetation

Oxidation is a fundamentala part of the everyday metabolic system in residingstructures. In the oxidative system, reactive oxygen species (hydrogen peroxide and hypochlorous acid) and plenty ofloose radicals (hydroxyl radical (OH) and superoxide anion) are generated [31, 32]. Rapid introduction of loose radicals may alsopurposealternatewithinside theshape, feature of mobileparts and membranes. It can bring about human neurologic and differentproblemsalong withmost cancers, diabetes, cardiovascular, neurodegenerative illnesses, inflammatory ailment, asthma, and untimelygetting old [33, 34].

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 6 Nov-Dec 2022, pp: 841-848 www.ijprajournal.com ISSN: 2456-4494

Therefore, the antioxidants or the loose radical scavenging molecules require prevention of the above situationswithinside theframe. There are lots of antioxidant materialsfound invegetation (end result, medicinal herbs, greens etc.) and the antioxidant or loose radical scavenging molecules found in them are withinside theshape of phenolic compounds (e.g. phenolic acids, quinones, coumarins, lignans, flavonoids, tannins), nitrogen compounds (alkaloids, amines), nutrients, terpenoids (inclusive of carotenoids), and a fewdifferent endogenous metabolites [35-36]. One mustconstantlygrowth the consumption of mealswealthy in antioxidant compounds to hold a wholesomeframe, decrease the hazard of persistentfitnessissuesrelated to the above ailmentsituations [37-38]. Naturally going on antioxidants in mealsmay be used for the prevention and remedy of loose radical-associatedproblems [38, 39]. Naturally going on antioxidants also canget replacedthrough commercially available, artificial antioxidants along with 15 butylatedhydroxytoluene (BHT) and butylatedhydroxy anisole (BHA). Synthetic antioxidants are prettydangerousto apply and islimiteddue to their carcinogenic outcomes. Nitric oxide (NO) is an powerful pleiotropic inhibitor of physiological methodsalong with neuronal signaling, clean muscle relaxation, inhibition of platelet aggregation and law of mobile mediated toxicity. It is a diffusible loose radical that performsnumerous roles as an effector molecule in exclusiveorganicstructuresinclusive of neuronal messenger, vasodilatation, antimicrobial and antitumor sports [40].

The mechanism of motion of antioxidants Low molecular weight antioxidants (LMWAs) [41] are small molecules that often infiltrate cells, accumulate (at excessive concentrations) in particularcubiclesrelated to oxidative harm, after which are regenerated through the mobile [42]. In human tissues, mobile LMWAs are acquired from numerousreassets. Glutathione (GSH), nicotinamide adenine dinucleotide (decreasedshape), and carnosine [43] are synthesized through the cells; uric acid (UA) [44] and bilirubin [45] are waste merchandise of mobile metabolism; ascorbic acid (AA) [46], tocopherols and polyphenols are antioxidants acquired from the eating regimen. Among those LMWAs, a full-sizeinterestturned intotargeted on ascorbic acid (AA), acknowledged for its reductive homes and for its use on a extensive scale as an antioxidant agent in meals and drinks [47], it's alsocrucial for healingfunctions and organic metabolism. Ascorbic acid is an antioxidant with healinghomes, which performs an crucialfunction in activating the immune reaction, wound recuperation, osteogenesis, sixteen detoxifying the organism, iron absorption, collagen biosynthesis, stopping the clotting of blood vessels and in lots ofdifferent metabolic methods [48-49]. Vitamin C may beeffortlessly oxidized, its degradation being extendedthroughwarmth, mild and the presence of heavy steel cations [50-51]. Thus, because of its content materialvariant, nutrition C represents ancrucialexceptional indicator of foodstuffs [52] and contributes to the antioxidant homes of meals [53-54]. Special interest has been devoted to the look at of mechanism of motion of antioxidants. The low density lipoproteins (LDL) are oxidizes through the extraloose radicals circulating withinside theframe, making them doubtlessly lethal. The extraloose radicals also canboost upgetting oldmethods and had beenrelated to different very critical pathologies, along with diabetes mellitus, rheumatoid arthritis, mind stroke and parkinson'sailment, alzheimer'sailment and most cancers. Reactive oxygen species (ROS) incorporate species with a sturdy oxidizing tendency, each of a thorough nature (the superoxide radical, the hydroxyl radical) and a non-radical nature (ozone, hydrogen peroxide) [55]. A quantity of chemical and bodily phenomena can provoke oxidation, which proceedsconstantlywithinside the presence of appropriate substrate(s), till a blocking offprotection mechanism occurs [56]. Target materialsencompass oxygen, polyunsaturated fatty acids, phospholipids, ldl cholesterol and DNA [115]. The vitalfunctions of oxidation through a loose radical-mediated chain response are initiation, propagation, branching and termination steps [57]. The 17 systemcan be initiated through the motion of outsideretailersalong withwarmth, mild or ionizing radiation or through chemical initiation regardingsteel ions or metalloproteins [58].

Initiation step

LH + R· → L· + RH LH represents the substrate molecule (mlipid), with R· because thebeginning oxidizing radical. In oxidation the lipid generates aextraordinarily reactive allyl radical (L·) react with oxygen to shape a lipid peroxyl radical (LOO·). Propagation step L· + O2 → LOO· LOO· + LH → L· + LOOH In this response the peroxyl radicals are the chain providers of the response. They oxidizes the lipid similarly to generating lipid hydroperoxides

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 6 Nov-Dec 2022, pp: 841-848 www.ijprajournal.com ISSN: 2456-4494

(LOOH), which in flipdamageright all the way down to a extensivevariety of compounds [59], inclusive of alcohols, aldehydes, alkyl formates, ketones and hydrocarbons, and radicals, inclusive of the alkoxyl radical (LO·).

Branching step

LOOH → LO· + HO·

2 LOOH → LOO· + LO· + H2O The breakdown of lipid hydroperoxides regularlyincludes transition steel ion catalysts, in reactions much likethe onesregarding hydrogen peroxide, yielding lipid peroxyl and lipid alkoxyl radicals.

Termination step In termination step reactions contain the aggregate of radicals to shape non-radical merchandise. LO· + LO· LOO· + LOO· LO· + LOO· Thenumber one antioxidants (AH) are affords in hintquantities, it reasonsbothput off or inhibit the initiation step through reacting with a lipid radical or inhibit the propagation step through reacting with peroxyl or alkoxyl radicals [60]. L· + AH → LH + A· LOO· + AH → LOOH + A· LO· + AH → LOH + A· Preventative antioxidants or secondary antioxidants are compounds that retard the price of oxidation. This can becarried out in some of ways, inclusive ofelimination of substrate or singlet oxygen quenching [61-62].

Methods of general antioxidantpotentialevaluationThenumerous analytical strategies [126] of assessment of the antioxidant potential fall into awesomeclassessuggestswithinside the Table-1 and Table-2. 19 Table-1: Various spectrometry strategies of assessment of the antioxidant potential Spectrometry strategies DPPH Antioxidant response with an natural radical ColorimetryABTS Antioxidant response with an naturalcation radical Colorimetry FRAP Antioxidant ferricyanide discount through antioxidants and nextraction of potassium ferrocyanide with Fe3+ Colorimetry CUPRAC Cu(II) discount to Cu(I) through antioxidants ColorimetryORAC Antioxidant response with peroxyl radicals, brought onthrough AAPH (2,2'-azobis-2-amidino-propane) Loss of fluorescence of fluoresceinHORAC Antioxidant potential to quench OH radicals generated through a Co(II) primarily based totally Fenton-like gadget Loss of fluorescence of fluoresceinTRAP Antioxidant potential to scavenge luminol-drived radicals, generated from AAPH decomposition Chemilumine scence quenching Fluorimetry Emission of mildthrough a substance that has absorbed mild or different electromagnetic radiation of a exclusive wavelength Recording of fluorescence excitation/emission spectra 20

Table-2: Various electrochemical and chromatography strategies of assessment of the antioxidant potential. Electrochemical strategies

Cyclic voltammetry

The ability of aoperating electrode is linearly numerous from an preliminaryprice to a very lastprice and back, and the respectively present daydepth is recorded. Measurement of the depth of the cathode anodic top.AmperometryThe ability of the operating electrode is ready at a hard and fastprice with appreciate to a reference electrode. Measurement of the depth of the present day generated through the oxidation/discount of an electroactiveanalyte. Biamperometry The response of the analyte (antioxidant) with the oxidization redox couple.Measurement of the present day flowing amongsameoperating electrodes, at a small abilitydistinction and immersed in an answer containing the analyzed pattern and a reversible redox couple.

Chromatography strategies

Gas chromatography Separation of the compounds in a combination is primarily based totallyat the repartition among a liquid desk boundsection and a fuelolinecellsection. Flame ionization or therma; conductivity detection. High overall performance liquid chromatography Separation of the compounds in a combination is primarily based totallyat the repartition among a strongdesk boundsection with exclusive polarities, at excessivefloatprice and strain of the cellsection UV-VIS (e.g. diode array) detection, fluorescence, mass spectrometry or electrochemical detection.Antioxidant potential assay Principle of the approach End-product determination.21 Spectrometric strategies [62-63] depend on the response of a thorough, radical cation or complicated with an antioxidant molecule successful to donate a hydrogen atom.

Nitric oxide radical scavenging interest

Nitric oxide (NO) and reactive nitrogen species (RNS) are loose radicals which are derived from the interplay of NO with oxygen or reactive oxygen species [64]. Because of its unpaired electron, the nitric oxide is assessed as a loose radical. It presentationscrucial reactivity with surevarieties of proteins and differentloose radicals along with superoxide [65]. Nitric oxide (NO) is synthesized through3 isoforms of the enzyme nitric oxide synthase (NOS), endothelial NOS, neuronal

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 6 Nov-Dec 2022, pp: 841-848 www.ijprajournal.com ISSN: 2456-4494

NOS, and inducible NOS (iNOS). Chronic publicity to nitric oxide radical is related tonumerous carcinomas and inflammatory situationsinclusive ofa couple of sclerosis, juvenile diabetes, arthritis, and ulcerative colitis. The toxicity of NO will increasesignificantlywhile it reacts with the superoxide radical, forming the extraordinarily reactive peroxynitriteanion (ONOO−) [68]. Nitric oxide has been proven to be without delay scavenged through flavonoids [69].

ABTS [2,2'-azinobis-(3-ethylbenzothiazoline-6-sulfonate)] assay In the ABTS assay, additionallyreferred to astroloxequal antioxidant potential assay, the inexperienced–blue solid radical cationic chromophore, 2,2-azinobis-(three-22 ethylbenzothiazoline-6-sulfonate) (ABTS•+) is produced through oxidation, and has absorption maxima at 414, 645, 734, and 815 nm [144]. In the unique assay, metmyoglobin turned into first handled with H2O2 to generate the ferrylmyoglobin radical, which turned into then traeted with ABTS to shape the ABTS•+. More recently, exclusivetechniqueshad been used for ABTS•+ generation, inclusive ofresponse with manganese dioxide, 2,2′-azobis-2-amidinopropane.dihydrochloride (AAPH), or potassium persulfate [69], enzymatic responsethe use of horseradish peroxidase, or electrochemical oxidation. There also arefull-sizeversionswithinside thesaid assay situations, e.g., responseinstances ranging among 1 min and 30 min.

The FRAP (ferric decreasing antioxidant power) approach: Ferric decreasing antioxidant power (FRAP) assay is utilized in a redox-related colorimetric response. Antioxidants are molecules, which act as decreasingretailersthrough donating electrons to loose radicals to reduce the harmdue toloose radicals to cells, DNA and organ structures.

REFERENCES:

[1]. Kalemba D and Kunicka A, Antibacterial and antifungal properties of essential oils. Curr. Med. Chem., 2003, 10, 813-829.

[2]. Ali MS, Yaghmour RM and Faidi YR, Antimicrobial activity of 20 plants used in folkloric medicine in the Palestinian area. J. Ethnopharmacol., 1998, 60, 256-271.

[3]. Barbour E, Sharif MA, Sagherian VK and Habre AN, Screening of selected indigenous plants of Lebanon for antimicrobial activity. J. Ethnopharmacol., 2004, 93, 1-7.

[4]. Yasunaka K, Abe F and Nagayama A, Antibacterial activity of crude extracts from Mexican medicinal plants and purified coumarins and xanthones. J. Ethnopharmacol., 2005, 97, 293-299.

[5]. Pankaj B, Nariya, Nayan R, Bhalodia, Shukla, and Acharya, Antimicrobial and antifungal activities of Cordiadichotoma (Forster F.) bark extracts. Ayu. 2011, 32, 585–589.

[6]. Towers GH, Lopez A and Hudson JB, Antiviral and antimicrobial activities of medicinal plants. J. Ethnopharmacol., 2001, 77, 189-196.

[7]. Koshy P, Nurestri AM and Wirakarnain S, Antimicrobial activity of some medicinal plants from Malaysia. Am. J. Appl. Sci., 2009, 6, 1613-1617.

[8]. Murray BE, Problems and dilemmas of antimicrobial resistance. Pharmacother, 1992, 12, 865-895.

[9]. Madunagu BE, Ebana RB, Udo SM and Ndifon LT, Antimicrobial effects of Ixoradivaricata and Citrus aurantifolia on some pathogens and drug resistant Neisseria gonorrhoeae. Niger. J. Bot., 2001, 14, 63-69.

[10]. Senthilkumar PK and Reetha D, Screening of antimicrobial properties of certain Indian medicinal plants. J. Phytol., 2009, 1, 193-198.

[11]. Usman Ali K, Hazir R, Zeeshan N, Muhammad Q, Jafar K, Tayyaba, and Bushra R, Antibacterial activity of some medicinal plants against selected human pathogenic bacteria. Eur J MicrobiolImmunol (Bp), 2013, 3, 272–274.

[12]. Rojas R, Bustmante B, and Bauer J, Antimicrobial activity of selected Peruvian medicinal plants. J. Ethnopharmacol., 2003, 88, 199-204.

[13]. Geyid A, Abebe D, Debella A, Mekonnen Z, Aberra F, Teka F, Kebede T, Urga K, Yersaw K, Biza T, Haile mariam B and Guta M, Screening of some medicinal plants of Ethiopia for their anti-microbial properties and chemical profiles. J. Ethnopharmacol., 2005, 97, 421-427.

[14]. Richard ME, Chelsea W, Raquel FE, Nathan AM, Molecular mechanisms of membrane targeting antibiotics. BiochimicaetBiophysicaActa, 2016, 18, 980–987.

[15]. Paz E, Screening of Uruguayan medicinal plants for antimicrobial activity. J. Ethnopharmacol., 1995, 45, 67-70.

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 6 Nov-Dec 2022, pp: 841-848 www.ijprajournal.com ISSN: 2456-4494

[16]. Kudi AC, Umoh JU and Eduvie LO, Screening of some Nigerian medicinal plants for antibacterial activity. J. Ethnopharmacol., 1999, 67, 225-228.
[17]. Palombo EA and Semple SJ, Antibacterial activity of traditional Australian medicinal plants. J. Ethnopharmacol., 2001, 77, 151-157.
[18]. Onwuliri FC and Dawang ND, Antibacterial activity of aqueous and ethanolic leaf extract of drumstick plant (Moringaoleifera Lam.) on some bacterial species associated with gastrointestinal diseases. Niger. J. Bot., 2006, 272-279.
[19]. Archer GL and Ronald PE, Treatment and prophylaxis of bacterial infections, Harrison's Principle. Inter. Med., 2001, 15, 867-881.
[20]. Roden DM, Kasper DL, Braunwald E, Harrison's Principles of Internal Medicine. New York, McGraw-Hill, 16th ed., 2004, 325-327.
[21]. Conte JE, Manual of antibiotics and infectious diseases; treatment and prevention. Lippincott Williams and Wilkins, Philadelphia, 9th ed., 2002, 381-385.
[22]. Okeke IN, Laxminarayan R and Bhutta ZA, Antimicrobial resistance in developing countries, recent trends and current status. Lancet Infect Dis., 2005, 481-493.
[23]. Iona P, Andy H, Gabriela O, Craig B, and Nick T, Optimising antibiotic usage to treat bacterial infections. Sci Rep. 2016, 6, 37853-37862.
[24]. Van Waaij D and Nord CE, Development and persistence of multi-resistance to antibiotics in bacteria an analysis and a new approach to this urgent problem. Int. J. Antimicrob. Agents, 2000, 191-197.
[25]. Levin AS and Levy CE, Severe nosocomial infections with imipenem-resistant Acinetobacterbaumannii treated with ampicillin/sulbactam. Int. J. Antimicrob. Agents, 2003, 21, 58-62.
[26]. Ryan KJ, Ray CG, Sherris Medical Microbiology (4th ed.). McGraw Hill.2004, 8385.
[27]. Robert A, Rastall Prebiotics and Probiotics Science and Technology. Springer Science & Business Media, 2009, 627.
[28]. Christopher A, Sanford Elaine C, Jong, The travel and tropical medicine manual. Elsevier health sciences, 2008, 469.
[29]. Asaeda G, Caicedo G, Swanson C, "Fried Rice Syndrome". Journal of Emergency Medical Services, 2005, 30, 30–32.
[30]. Prescott LM, Harley JP and Klein OA, Microbiology. Mc-Graw Hills, New York, 6th ed., 2005, 376-389.
[31]. Abbas AK, Jens L and Birgit K, T cell tolerance and autoimmunity. Autoimmun. Rev., 2004, 3, 471-475.
[32]. Willey J, Sherwood L and Woolverton C, Prescott, Harley, and Klein's Microbiology. McGraw-Hill, New York, 7 ed., 2008, 312-314.
[33]. Akinnibosun F, Ibeh IN and Osaghae F, Antibacterial activity of PhyllanthusamarusSchum and Thonn on five vegetative organisms. Plant Archiv., 2008, 8, 563-568.
[34]. Okemo P, Nwanta W and Chabra S, The kill kinetics of Azadirachta indica A. Juss. (Meliaceae) extracts on Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa and Candida albicans. Fran. J. Sci. Technol., 2001, 2, 113-118.
[35]. Howard DH, Pathogenic fungi in humans and animals (2nd ed.). Marcel Dekker, 2003, ISBN 978-0-8247-0683-8.
[36]. Handwerk, Brian Egypt's "King Tut Curse" Caused by Tomb Toxins National Geographic. 2005.
[37]. Amson RA, Houbraken J, Summerbell RC, Flannigan B, Miller JD "Common and important species of fungi and actinomycetes in indoor environments". Microogranisms in home and indoor work environments, 2001, 287–292. ISBN 978-0415268004.
[38]. Soares C, Calado T, Venâncio A, Mycotoxin production by Aspergillus niger aggregate strains isolated from harvested maize in three Portuguese regions. Rev IberoamMicol. 2013, 30, 9-13.
[39]. Finkel T and Holbrook NJ, Oxidants, oxidative stress and the biology of ageing. Nature, 2000, 408, 239-247.
[40]. Pietta P, Flavonoids as antioxidant. J. Nat. Prod., 2000, 63, 1035-1042.
[41]. Sun J, Chu YF and Wu XZ, Antioxidant and antiproliferative activities of common fruits. J. Agr. Food Chem., 2002, 50, 7449-7454.

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 6 Nov-Dec 2022, pp: 841-848 www.ijprajournal.com ISSN: 2456-4494

[42]. Young IS and Wood JV, Antioxidants in health and disease. J. Clin. Pathol., 2001, 54, 176-186.
[43]. Zheng W and Wang SY, Antioxidant activity and phenolic compounds in selected herbs. J. Agri. Food Chem., 2001, 49, 5165-5170.
[44]. Cai YZ, Sun M and Corke H, Antioxidant activity of betalains from plants of the Amaranthaceae. J. Agr. Food Chem., 2003, 51, 2288-2294.
[45]. Govindarajan R, Vijayakumar M and Pushpangadan P, Antioxidant approach to disease management and the role of 'Rasayana' herbs of Ayurveda. J. Ethnopharmacol., 2005, 99, 165-178.
[46]. Naruthapata C and Supaporn S, Antioxidant and radical scavenging activity of herbal medicine samples. Pure Appl. Chem. Int. Confer., 2009, 42-44.
[47]. Mukul C, A review on Morphology, Phytochemistry and pharmacological activities of medicinal herb PlumbagoZeylanica Linn. Journal of Pharmacognosy and Phytochemistry, 2014, 3, 95-118.
[48]. Klipstein GK, Launer LJ and Geleijnse JM, Serum carotenoids and atherosclerosis, the rotterdam study. Atherosc., 2000, 148, 49-56.
[49]. Bimal K, Rai BK and Nisha A, Synthesis, characterization and antimicrobial screening of Cobalt(II), Nickel(II) and Copper(II) complexes with schiff base derived from 2-Phenyl quinoxalinethiosemicarbazone. Orient. J. Chem., 2011, 1173-1178.
[50]. EJ, Kandaswami C and Theoharides TC, The effects of plant flavonoids on mammalian cells, implications for inflammation, heart disease and cancer. Pharmacol. Rev., 2000, 52, 673-751.
[51]. Kumar S and Kumar D, Antioxidant and free radical scavenging activities of edible weeds. Afr. J. food agri. Nut.Develop., 2009, 9, 1174-1178.
[52]. Shreejayan D and Rao NA, Nitric oxide scavenging by curcuminoids. J. Pharm. Pharmacol., 1997, 49, 105-107.
[53]. Chevion S, Roberts MA, Chevion M, The use of cyclic voltammetry for the evaluation of antioxidant capacity. Free RadicBiol Med 2000, 28, 860-870.
[54]. Halliwell B, Gutteridge J, Free radicals in biology and medicine. Clarendon Press, Oxford. 1999,
[55]. Chance PA, Sies H and Boveris A, A hydroperoxide metabolism in mammalian organs. Physiol Rev., 1999, 59, 527-605.
[56]. Settle T and Klandorf H, The role of uric acid as an antioxidant in selected neurodegenerative disease pathogenesis, Brain DisordTher., 2014, 3, 129-133.
[57]. Stocker R, Yamamoto Y, McDonagh A, Glazer AN and Ames BN, Bilirubin is an antioxidant of possible physiological importance. Science, 1997, 235, 1043-1045.
[58]. Sebastian P, Arie K, Yaohui W, Peter E, Oran K, Je-Hyuk L, Shenglin C, Christopher C, Anand D, Sudhir D, and Mark L, Vitamin C as an Antioxidant, evaluation of its role in disease prevention. Journal of the American College of Nutrition, 2003, 22, 18–35.
[59]. Raoof JB, Ojani R and Beitollahi H, Electrocatalytic determination of ascorbic acid at chemically modified carbon paste electrode with 2, 7-bis (ferrocenylethynyl) fluoren-9-one. Int J Electrochem Sci., 2007, 2, 534-548.
[60]. Tomita IN, Manzoli A, Fertonani FL and Yamanaka H, Amperometric biosensor for ascorbic acid. EcletQuím, 2005, 30, 37-43.
[61]. Voet D and Voet J, Biochemistry. (2ndedn), John Wiley & Sons, New York. 1995.
[62]. Mello LD and Kubota LT, Biosensors as a tool for the antioxidant status evaluation. Talanta, 2007, 72, 335-348.
[63]. Bhagavan NV, Medical Biochemistry. Elsevier, Amsterdam, 2002.
[64]. Mohora M, Biochimiemedicala. EdituraNiculescu, Bucuresti L, Wawrzyniak J, Ryniecki A and Zembrzuski W, Application of voltammetry to determine vitamin C in apple juices. ActaSci Pol Technol Aliment, 2006, 42, 5-16.
[65]. Glevitzky M, Pop M, Brusturean G A, Bogdan I, Calisevici M, Efficent use of antioxidants to preserve fruit juice. Rev Chim (Bucharest), 2008, 59, 1291-1295.
[66]. Popa CV, Danet AF, Jipa S and Zaharescu T, Determination of total antioxidant activity of wines using a flow injection method with chemiluminescence

detection. Rev Chim (Bucharest), 2010, 61, 11-16.

[67]. Pisoschi AM, Danet AF and Kalinowski S, Ascorbic acid determination in commercial fruit juice samples by cyclic voltammetry. JAMMC 8, 2008.

[68]. Pisoschi AM, NegulescuGh P and Pisoschi A. Ascorbic acid determination by an amperometricascorbate oxidase-based biosensor. Rev Chim (Bucharest), 2010, 61, 339-344.

[69]. Pisoschi AM, Pop A, NegulescuGh P and Pisoschi A. Determination of ascorbic acid content of some fruit juices and wine by voltammetry .Performed at Pt and carbon paste electrodes. Molecules, 2011, 16, 1349-1365.

[70]. Campanella L, Martini E, Rita E and Tomassetti M. Antioxidant capacity of dry vegetal extracts checked by voltammetric method. J Food Agric Environ 2006, 4, 135-144.