



References

References

- Ahuja A, Ali J, Rahman S, Biodegradable periodontal intrapocket device containing metronidazole and amoxicillin: formulation and characterization, *Die Pharmazie Int J Pharm Sci*, 61(1):25-9, (2006).
- Aishwarya S, Mahalakshmi S, Sehgal PK, Collagen-coated polycaprolactone microparticles as a controlled drug delivery system, *J Microencapsul*, 25(5):298-306, (2008).
- Aitken S, Birek P, Kulkarni G, Lee W, McCulloch C, Serial doxycycline and metronidazole in prevention of recurrent periodontitis in high-risk patients, *J Periodontol*, 63(2):87-92, (1992).
- Akash MSH, Rehman K, Recent progress in biomedical applications of Pluronic (PF127): pharmaceutical perspectives, *J Control Release*, 209:120-38, (2015).
- Al Khateb K, Ozhmukhametova EK, Mussin MN, Seilkhanov SK, Rakhypbekov TK, Lau WM, *et al.*, In situ gelling systems based on Pluronic F127/Pluronic F68 formulations for ocular drug delivery, *Int J Pharm*, 502(1):70-9, (2016).
- Álvarez AL, Espinar FO, Méndez JB, The application of microencapsulation techniques in the treatment of endodontic and periodontal diseases, *Pharmaceutics*, 3(3):538-71, (2011).
- Anal AK, Stevens WF, Remunan-Lopez C, Ionotropic cross-linked chitosan microspheres for controlled release of ampicillin, *Int J Pharm*, 312(1):166-73, (2006).
- Analytical Methods Committee AN, Experimental design and optimisation (4): Plackett-Burman designs, *Anal Methods*, 5:1901-3, (2013).
- Anatomy of the teeth, Accessed on 25/08/17, Available at http://intranet.tdmu.edu.ua/data/kafedra/internal/stomat_ortop/classes_stud/en/stomat/ptn/Propaedeutics%20of%20orthopedic%20stomatology/2/02.%20Teeth,%20tooth%20rows.%20Groups%20of%20teeth.htm.
- Anderson BC, Pandit NK, Mallapragada SK, Understanding drug release from poly (ethylene oxide)-b-poly (propylene oxide)-b-poly (ethylene oxide) gels, *Int J Pharm*, 70(1):157-67, (2001).
- Armitage GC, Development of a classification system for periodontal diseases and conditions, *Ann Periodontol*, 4(1):1-6, (1999).
- Bader H, Adjunctive periodontal therapy: a review of current techniques, *Dent Today*, 29(7):94-6, (2010).

- Bai F, Yang X, Huang W, Synthesis of narrow or monodisperse poly (divinylbenzene) microspheres by distillation–precipitation polymerization, *Macromolecules*, 37(26):9746-52, (2004).
- Bakó J, Vecsernyés M, Ujhelyi Z, Kovácsné IB, Borbíró I, Bíró T, *et al.*, Composition and characterization of in situ usable light cured dental drug delivery hydrogel system, *J Mater Sci Mater Med*, 24(3):659-66, (2013).
- Ballauff M, Lu Y, “Smart” nanoparticles: preparation, characterization and applications, *Polym*, 48(7):1815-23, (2007).
- Baloğlu E, Karavana SY, Hyusein IY, Köse T, Design and formulation of mebeverine HCl semisolid formulations for intraorally administration, *AAPS PharmSciTech*, 11(1):181-8, (2010).
- Bansal K, Rawat M, Jain A, Rajput A, Chaturvedi T, Singh S, Development of satranidazole mucoadhesive gel for the treatment of periodontitis, *AAPS PharmSciTech*, 10(3):716-23, (2009).
- Bansal M, Mittal N, Singh TB, Assessment of the prevalence of periodontal diseases and treatment needs: A hospital-based study, *J Indian Soc Periodontol*, 19(2):211-5, (2015).
- Bansal M, Mittal N, Yadav SK, Khan G, Mishra B, Nath G, Clinical evaluation of thermoresponsive and mucoadhesive Chitosan in situ gel containing Levofloxacin and Metronidazole in the treatment of periodontal pockets-A split-mouth, clinical study, *J Pierre Fauchard Acad*, 30(1):6-14, (2016).
- Beckett AH, Stenlake JB, Practical Pharmaceutical Chemistry: Part II Fourth Edition: A & C Black, *Athlone Press London*, (1988).
- Bermudez J, Grau R, Thermosensitive poloxamer-based injectables as controlled drug release platforms for veterinary use: Development and in-vitro evaluation, *Int Res J Pharm Pharmacol*, 1:109-18, (2011).
- Bilensoy E, Abdur Rouf M, Vural I, Şen M, Atilla Hincal A, Mucoadhesive, thermosensitive, prolonged-release vaginal gel for clotrimazole: β -cyclodextrin complex, *AAPS PharmSciTech*, 7(2):E54-E60, (2006).
- Bogardus JB, Blackwood RK, Solubility of doxycycline in aqueous solution, *J Pharm Sci*, 68(2):188-94, (1979).
- Bogdan M, Floare CG, Piirnau A, editors, 1H NMR investigation of self-association of vanillin in aqueous solution, *J. Phys. A Journal of Physics: Conference Series 182; IOP Publisher*, 1-5, (2009).
- Boussès C, Ferey L, Vedrines E, Gaudin K, Using an innovative combination of quality-by-design and green analytical chemistry approaches for the development of a

- stability indicating UHPLC method in pharmaceutical products, *J Pharm Biomed Anal*, 115:114-22, (2015).
- Breccia A, Nitroimidazoles: chemistry, pharmacology, and clinical application. *Springer Sci Business Med*, 45, (2012).
- Brittain H. Ionic Equilibria and the pH Dependence of Solubility: IInd Edition, *Springer, New York*, (2007).
- Broadhead J, Edmond Rouan S, Rhodes C, The spray drying of pharmaceuticals, *Drug Dev Ind Pharm*, 18(11):1169-206, (1992).
- Bruschi ML, de Freitas O, Lara EHG, Panzeri H, Gremião MPD, Jones DS, Precursor system of liquid crystalline phase containing propolis microparticles for the treatment of periodontal disease: development and characterization. *Drug Dev Ind Pharm*, 34(3):267-78, (2008).
- Bruschi ML, Jones DS, Panzeri H, Gremião MP, De Freitas O, Lara EH, Semisolid systems containing propolis for the treatment of periodontal disease: in vitro release kinetics, syringeability, rheological, textural, and mucoadhesive properties, *J Pharm Sci*, 96(8):2074-89, (2007).
- Burri J, Graf M, Lambelet P, Löliger J, Vanillin: more than a flavouring agent-a potent antioxidant, *J Sci Food Agric*, 48(1):49-56, (1989).
- Cabana A, Amít-Kadi A, Juhász J, Study of the gelation process of polyethylene oxide a-polypropylene oxide b-polyethylene oxide a copolymer (Pluronic 407) aqueous solutions, *J Colloid Interface Sci*, 190(2):307-12, (1997).
- Castro LJ, Sahagún AM, Diez MJ, Fernández N, Sierra M, García JJ, Pharmacokinetics of doxycycline in sheep after intravenous and oral administration, *Vet J*, 180(3):389-95, (2009).
- Caton J, Ryan ME, Clinical studies on the management of periodontal diseases utilizing subantimicrobial dose doxycycline (SDD), *Pharmacol Res*, 63(2):114-20, (2011).
- Center AD, Periodontal disease, Accessed on 25/05/2017, Available from: <http://www.alliancedentalny.com/services-gumtreatment/2017>.
- Chan E-S, Preparation of Ca-alginate beads containing high oil content: Influence of process variables on encapsulation efficiency and bead properties, *Carbohydr Polym*, 84(4):1267-75, (2011).
- Chan L, Lee H, Heng P, Production of alginate microspheres by internal gelation using an emulsification method, *Int J Pharm*, 242(1):259-62, (2002).
- Chenite A, Chaput C, Wang D, Combes C, Buschmann M, Hoemann C, *et al.*, Novel injectable neutral solutions of chitosan form biodegradable gels in situ, *Biomaterials*, 21(21):2155-61, (2000).

- Ciancio S, Ashley R, Safety and efficacy of sub-antimicrobial-dose doxycycline therapy in patients with adult periodontitis, *Adv Dent Res*, 12(1):27-31, (1998).
- Costa P, Lobo JMS, Modeling and comparison of dissolution profiles, *Eur J Pharm Sci*, 13(2):123-33, (2001).
- Cotti E, Dessì C, Piras A, Mercurio G, Can a chronic dental infection be considered a cause of cardiovascular disease? A review of the literature, *Int J Cardiol*, 148(1):4-10, (2011).
- Craig RG, Spittle MA, Levin NW, Importance of periodontal disease in the kidney patient, *Blood Purif*, 20(1):113-9, (2002).
- Dabhi MR, Sheth NR, Formulation development of physiological environment responsive periodontal drug delivery system for local delivery of metronidazole benzoate, *Drug Dev Ind Pharm*, 39(3):425-36, (2013).
- Dai YN, Li P, Zhang JP, Wang AQ, Wei Q, Swelling characteristics and drug delivery properties of nifedipine-loaded pH sensitive alginate-chitosan hydrogel beads, *J Biomed Mater Part B: Appl Biomater*, 86(2):493-500, (2008).
- de Sousa FO, Blanco-Méndez J, Pérez-Estévez A, Seoane-Prado R, Luzardo-Álvarez A, Effect of zein on biodegradable inserts for the delivery of tetracycline within periodontal pockets, *J Biomater Appl*, 27(2):187-200, (2012).
- de Souza Ferreira SB, de Assis Dias BR, Obregón CS, Gomes CC, de Araújo Pereira RR, Ribeiro Godoy JS, *et al.*, Microparticles containing propolis and metronidazole: in vitro characterization, release study and antimicrobial activity against periodontal pathogens, *Pharm Dev Technol*, 19(2):173-80, (2014).
- Deasy P, Collins AE, Maccarthy DJ, Russell R, Use of strips containing tetracycline hydrochloride or metronidazole for the treatment of advanced periodontal disease, *J Pharm Pharmacol*, 41(10):694-9, (1989).
- Desai SR, Dharwadkar SR, Study of polymorphic transformation of ornidazole drug by differential scanning calorimetry and other complementary techniques, *Acta Pol Pharm*, 65:409-13, (2008).
- Dimitrova E, Bogdanova S, Mitcheva M, Tanev I, Minkov E, Development of model aqueous ophthalmic solution of indomethacin, *Drug Dev Ind Pharm*, 26(12):1297-301, (2000).
- Do M, Neut C, Delcourt E, Certo TS, Siepmann J, Siepmann F, In situ forming implants for periodontitis treatment with improved adhesive properties, *Eur J Pharm Biopharm*, 88(2):342-50, (2014).
- Dos Santos CA, Ribeiro GB, Knirsch MC, Junior AP, Vessoni Penna TC, Influence of Pluronic® F68 on ceftazidime biological activity in parenteral solutions, *J Pharm Sci*, 100(2):715-20, (2011).

- Dos Santos JE, Dockal ER, Cavaleiro ET, Synthesis and characterization of Schiff bases from chitosan and salicylaldehyde derivatives, *Carbohydr Polym*, 60(3):277-82, (2005).
- Dumortier G, Grossiord JL, Agnely F, Chaumeil JC, A review of poloxamer 407 pharmaceutical and pharmacological characteristics, *Pharm Res*, 23(12):2709-28, (2006).
- Economides N, Gogos C, Kolokouris I, Beltes P, Antoniadis D, Comparative study of the cytotoxic effect of Resilon against two cell lines, *Braz Dent J*, 19(4):291-5, (2008).
- Edwards DI, Nitroimidazole drugs-action and resistance mechanisms I. Mechanism of action, *J Antimicrob Chemother*, 31(1):9-20, (1993).
- Eick S, Selmann T, Pfister W, Efficacy of antibiotics to strains of periodontopathogenic bacteria within a single species biofilm—an in vitro study, *J Clin Periodontol*, 31(5):376-83, (2004).
- El-Kamel AH, Ashri LY, Alsarra IA, Micromatrical metronidazole benzoate film as a local mucoadhesive delivery system for treatment of periodontal diseases, *AAPS PharmSciTech*, 8(3):E184-E94, (2007).
- El-Leithy ES, Shaker DS, Ghorab MK, Abdel-Rashid RS, Evaluation of mucoadhesive hydrogels loaded with diclofenac sodium–chitosan microspheres for rectal administration, *AAPS PharmSciTech*, 11(4):1695-702, (2010).
- Eskan MA, Jotwani R, Abe T, Chmelar J, Lim J-H, Liang S, *et al.*, The leukocyte integrin antagonist Del-1 inhibits IL-17-mediated inflammatory bone loss. *Nature Immunol*, 13(5):465-73, (2012).
- Esposito E, Carotta V, Scabbia A, Trombelli L, D'Antona P, Menegatti E, *et al.*, Comparative analysis of tetracycline-containing dental gels: Poloxamer- and monoglyceride-based formulations, *Int J Pharm*, 142(1):9-23, (1996).
- Fathalla MAZ, Vangala A, Longman M, Khaled KA, Hussein AK, El-Garhy OH, *et al.*, Poloxamer-based thermoresponsive ketorolac tromethamine in situ gel preparations: Design, characterisation, toxicity and transcorneal permeation studies, *Eur J Pharm Biopharm*, 114:119-34, (2017).
- Ferreira SC, Bruns R, Ferreira H, Matos G, David J, Brandao G, *et al.*, Box-Behnken design: an alternative for the optimization of analytical methods, *Anal Chim Acta*, 597(2):179-86, (2007).
- Flemmig TF, Petersilka G, Völp A, Gravemeier M, Zilly M, Mross D, *et al.*, Efficacy and safety of adjunctive local moxifloxacin delivery in the treatment of periodontitis, *J Periodontol*, 82(1):96-105, (2011).

- Freitas S, Merkle HP, Gander B, Microencapsulation by solvent extraction/evaporation: reviewing the state of the art of microsphere preparation process technology, *J Control Release*, 102(2):313-32, (2005).
- Gad HA, El-Nabarawi MA, El-Hady SSA, Formulation and evaluation of PLA and PLGA in situ implants containing secnidazole and/or doxycycline for treatment of periodontitis, *AAPS PharmSciTech*, 9(3):878, (2008).
- Garg T, Singh S, Goyal AK, Stimuli-sensitive hydrogels: an excellent carrier for drug and cell delivery, *Crit Rev Ther Drug Carrier Sys*, 30(5):369-409, (2013).
- Garripelli VK, Kim J-K, Namgung R, Kim WJ, Repka MA, Jo S, A novel thermosensitive polymer with pH-dependent degradation for drug delivery, *Acta Biomaterialia*, 6(2):477-85, (2010).
- Genta I, Costantini M, Asti A, Conti B, Montanari L, Influence of glutaraldehyde on drug release and mucoadhesive properties of chitosan microspheres, *Carbohydr Polym*, 36(2):81-8, (1998).
- Ghasemian E, Vatanara A, Najafabadi AR, Rouini MR, Gilani K, Darabi M, Preparation, characterization and optimization of sildenafil citrate loaded PLGA nanoparticles by statistical factorial design, *DARU J Pharm Sci*, 21(1):1-10, (2013).
- Gierszewska-Drużyńska M, Ostrowska-Czubenko J, The effect of ionic crosslinking on thermal properties of hydrogel chitosan membranes, Progress on Chemistry and Application of Chitin and its Derivatives, *Polish Chitin Soc*, XV:25-32, (2010).
- Giovagnoli S, Tsai T, DeLuca PP, Formulation and release behavior of doxycycline-alginate hydrogel microparticles embedded into Pluronic F127 thermogels as a potential new vehicle for doxycycline intradermal sustained delivery, *AAPS PharmSciTech*, 11(1):212-20, (2010).
- Goldstein EJ, Sutter VL, Finegold SM, Comparative susceptibilities of anaerobic bacteria to metronidazole, ornidazole, and SC-28538, *Antimicrob Agents Chemother*, 14(4):609-13, (1978).
- Golub L, Wolff M, Lee H, McNamara T, Ramamurthy N, Zambon J, Further evidence that tetracyclines inhibit collagenase activity in human crevicular fluid and from other mammalian sources, *J Periodontol*, 20(1):12-23, (1985).
- Golub LM, McNamara TF, Ryan ME, Kohut B, Blieden T, Payonk G, Adjunctive treatment with subantimicrobial doses of doxycycline: effects on gingival fluid collagenase activity and attachment loss in adult periodontitis, *J Clin Periodontol*, 28(2):146-56, (2001).
- Golub LM, Sorsa T, Lee HM, Ciancio S, Sorbi D, Ramamurthy NS, Doxycycline inhibits neutrophil (PMN)-type matrix metalloproteinases in human adult periodontitis gingival, *J Clin Periodontol*, 22(2):100-9, (1995).

- Goodson JM, Antimicrobial strategies for treatment of periodontal diseases, *Periodontol*, 5(1):142-68, (2000).
- Govender S, Pillay V, Chetty D, Essack S, Dangor C, Govender T, Optimisation and characterisation of bioadhesive controlled release tetracycline microspheres, *Int J Pharm*, 306(1):24-40, (2005).
- Goyal AK, Rath G, Garg T, Nanotechnological approaches for genetic immunization, DNA and RNA Nanobiotechnologies in Medicine: Diagnosis and Treatment of Diseases, *Springer*, 67-120, (2013).
- Gratieri T, Gelfuso GM, Rocha EM, Sarmento VH, de Freitas O, Lopez RFV, A poloxamer/chitosan in situ forming gel with prolonged retention time for ocular delivery, *Eur J Pharm Biopharm*, 75(2):186-93, (2010).
- Greenstein G, Research, Science and Therapy Committee of the American Academy of Periodontol, Position paper: The role of supra-and subgingival irrigation in the treatment of periodontal diseases, *J Periodontol*, 76(11):2015-27, (2005).
- Gulati M, Anand V, Govila V, Jain N, Host modulation therapy: An indispensable part of perioceutics, *J Indian Soc Periodontol*, 18(3):282-8, (2014).
- Gupta H, Sharma A, Shrivastava B, Pluronic and Chitosan based In situ gel system for periodontal application, *Asian J Pharm*, 3(2):94-6, (2014).
- Gupta H, Singh R, Singh G, Kaushik D, Sharma A, pH-Induced in situ gel for periodontal anesthesia, *Indian J Pharm Sci*, 70(6):776-8, (2008).
- Gupta K, Jabrail FH, Glutaraldehyde cross-linked chitosan microspheres for controlled release of centchroman, *Carbohydr Res*, 342(15):2244-52, (2007).
- Gupta SC, Local drug delivery in Periodontics, *Indian J Dent Sci*, 12:32-4, (2010).
- Hamidi M, Azadi A, Rafiei P, Hydrogel nanoparticles in drug delivery, *Adv Drug Deliv Rev*, 60(15):1638-49, (2008).
- Havemose-Poulsen A, Holmstrup P, Factors affecting IL-1-mediated collagen metabolism by fibroblasts and the pathogenesis of periodontal disease: a review of the literature, *Crit Rev Oral Biol Med*, 8(2):217-36, (1997).
- Hejazi R, Amiji M, Stomach-specific anti-H. pylori therapy I: preparation and characterization of tetracycline-loaded chitosan microspheres, *Int J Pharm*, 235(1):87-94, (2002).
- Higashi K, Morisaki K, Hayashi Si, Kitamura M, Fujimoto N, Kimura S, Local ofloxacin delivery using a controlled-release insert (PT-01) in the human periodontal pocket, *J Periodontol*, 25(1):1-5, 1990.
- Hizarciolu Y, Zeynep A, Ozyazici M, Bioavailability file: ornidazole, *FABAD J Pharm Sci*, 29:133-44, (2004).

- Hoad C, Rayment P, Cox E, Wright P, Butler M, Spiller R, Investigation of alginate beads for gastro-intestinal functionality, Part 2: *In vivo* characterization, *Food Hydrocoll*, 23(3):833-9, (2009).
- Honibald EN, Mathew S, Padmanaban J, Sundaram E, Ramamoorthy RD, Periosteal: Matrix metalloproteinase inhibitors as an adjunctive therapy for inflammatory periodontal disease, *J Pharm Bioallied Sci*, 4(2):S417-S421, (2012).
- Houghton P, Fang R, Techatanawat I, Steventon G, Hylands PJ, Lee C, The sulphorhodamine (SRB) assay and other approaches to testing plant extracts and derived compounds for activities related to reputed anticancer activity, *Methods*, 42(4):377-87, (2007).
- Hu C, Feng H, Zhu C, Preparation and characterization of rifampicin-PLGA microspheres/sodium alginate in situ gel combination delivery system, *Colloid Surf B: Biointerfaces*, 95:162-9, (2012).
- Hu H, Xin JH, Hu H, Chan A, He L, Glutaraldehyde-chitosan and poly (vinyl alcohol) blends, and fluorescence of their nano-silica composite films, *Carbohydr Polym*, 91(1):305-13, (2013).
- Huang Y, Lapitsky Y, Monovalent salt enhances colloidal stability during the formation of chitosan/tripolyphosphate microgels, *Langmuir*, 27(17):10392-9, (2011).
- ICHQ2(R1), International Conference on Harmonization, Validation of analytical procedures: Text and methodology, In: Harmonization ICo, editor, (2005).
- Ikinci G, Şenel S, Akıncıbay H, Kaş S, Erciş S, Wilson C, Effect of chitosan on a periodontal pathogen *Porphyromonas gingivalis*, *Int J Pharm*, 235(1):121-7, (2002).
- Jacob SP, Nath S, Rat gingival model for testing drugs influencing inflammation, *Int Adv*, 7(2):8-16, (2013).
- Jain N, Jain GK, Javed S, Iqbal Z, Talegaonkar S, Ahmad FJ, Recent approaches for the treatment of periodontitis, *Drug Discov Today*, 13(21):932-43, (2008).
- Jain VM, Karibasappa GN, Dodamani AS, Vishwakarma PK, Mali GV, Comparative Assessment of Antimicrobial Efficacy of Different Antibiotic Coated Gutta-Percha Cones on *Enterococcus faecalis* An In vitro Study, *J Clin Diagn Res*, 10(9):ZC65-ZC68, (2016).
- Jamal T, Rahman A, Mirza A, K Panda A, Talegaonkar S, Iqbal Z, Formulation, antimicrobial and toxicity evaluation of bioceramic based ofloxacin loaded biodegradable microspheres for periodontal infection, *Curr Drug Deliv*, 9(5):515-26, (2012).
- Jameela SR, Jayakrishnan A, Glutaraldehyde cross-linked chitosan microspheres as a long acting biodegradable drug delivery vehicle: studies on the in vitro release of

- mitoxantrone and in vivo degradation of microspheres in rat muscle, *Biomaterials*, 16(10):769-75, (1995).
- James HP, John R, Alex A, Anoop K, Smart polymers for the controlled delivery of drugs—a concise overview, *Acta Pharm Sin B*, 4(2):120-7, (2014).
- Jaswal K, Dixit J, Jain A, Short-term clinical and microbiological effects of systemic ornidazole vs. Metronidazole in the treatment of generalized chronic periodontitis patients, *Internet J Dent Sci*, 8(1):1-7, (2008).
- Jayaprakash S, Halith S, Firthouse PM, Kulaturanpillai K, Nagarajan M, Preparation and evaluation of biodegradable microspheres of methotrexate, *Acta Pharm Sin B*, 3(1): 26-29, (2009).
- Jha RK, Tiwari S, Mishra B, Bioadhesive microspheres for bioavailability enhancement of raloxifene hydrochloride: formulation and pharmacokinetic evaluation, *AAPS PharmSciTech*, 12(2):650-7, (2011).
- Ji QX, Deng J, Xing XM, Yuan CQ, Yu XB, Xu QC, Biocompatibility of a chitosan-based injectable thermosensitive hydrogel and its effects on dog periodontal tissue regeneration, *Carbohydr Polym*, 82(4):1153-60, (2010).
- Jiang TY, Sun CS, Shen X, Wang TY, Wang SL, Development of a poloxamer analogs/bioadhesive polymers-based in situ gelling ophthalmic delivery system for tiopronin, *J Appl Polym Sci*, 114(2):775-83, (2009).
- Joshi D, Garg T, Goyal AK, Rath G, Advanced drug delivery approaches against periodontitis, *Drug Deliv*, 23(2):363-77, (2016).
- Kamma JJ, Nakou M, Mitsis FJ, The clinical and microbiological effects of systemic ornidazole in sites with and without subgingival debridement in early-onset periodontitis patients, *J Periodontol*, 71(12):1862-73, (2000).
- Kang F, Singh J, *In vitro* release of insulin and biocompatibility of *in situ* forming gel systems, *Int J Pharm*, 304(1):83-90, (2005).
- Kassem AA, Ismail FA, Naggat VF, Aboulmagd E, Preparation and evaluation of periodontal films based on polyelectrolyte complex formation, *Pharm Dev Technol*, 20(3):297-305, (2015).
- Katz J, Chaushu G, Sharabi Y, On the association between hypercholesterolemia, cardiovascular disease and severe periodontal disease, *J Clin Periodontol*, 28(9):865-8, (2001).
- Khan G, Patel RR, Yadav SK, Kumar N, Chaurasia S, Ajmal G, *et al.*, Development, optimization and evaluation of tinidazole functionalized electrospun poly (ϵ -caprolactone) nanofiber membranes for the treatment of periodontitis, *RSC Adv*, 6(102):100214-29, (2016b).

- Khan G, Yadav SK, Patel RR, Kumar N, Bansal M, Mishra B, Tinidazole functionalized homogeneous electrospun chitosan/poly (ϵ -caprolactone) hybrid nanofiber membrane: development optimization and its clinical implications, *Int J Biol Macromol*, 103:1311-26, (2017).
- Khan G, Yadav SK, Patel RR, Nath G, Bansal M, Mishra B, Development and evaluation of biodegradable chitosan Films of metronidazole and levofloxacin for the management of periodontitis, *AAPS PharmSciTech*, 17(6):1312-25, (2016a).
- Khan GM, Jiabi Z, Formulation and in vitro evaluation of ibuprofen-carbopol[®] 974P-NF controlled release matrix tablets III: influence of co-excipients on release rate of the drug, *J Control Release*, 54(2):185-90, (1998).
- Kim CJ, Drug release from compressed hydrophilic Polyox-WSR tablets, *J Pharm Sci*, 84(3):303-6, (1995).
- Kim E-Y, Gao Z-G, Park J-S, Li H, Han K, rhEGF/HP- β -CD complex in poloxamer gel for ophthalmic delivery, *Int J Pharm*, 233(1):159-67, (2002).
- Kirkwood KL, Rossa Jr C, The potential of p38 MAPK inhibitors to modulate periodontal infections, *Curr Drug Metab*, 10(1):55-67, (2009).
- Ko J, Park HJ, Hwang S, Park J, Lee J, Preparation and characterization of chitosan microparticles intended for controlled drug delivery, *Int J Pharm*, 249(1):165-74, (2002).
- Kogawa AC, Salgado HRN, Doxycycline hyclate: a review of properties, applications and analytical methods, *Int J Life Sci Pharm Res*, 2(4):11-25, (2012).
- Koukaras EN, Papadimitriou SA, Bikiaris DN, Froudakis GE, Insight on the formation of chitosan nanoparticles through ionotropic gelation with tripolyphosphate, *Mol Pharm*, 9(10):2856-62, (2012).
- Kumari N, Pathak K, Dual controlled release, *in situ* gelling periodontal sol of metronidazole benzoate and serratiopeptidase: statistical optimization and mechanistic evaluation, *Curr Drug Deliv*, 9(1):74-84, (2012).
- Lamp KC, Freeman CD, Klutman NE, Lacy MK, Pharmacokinetics and pharmacodynamics of the nitroimidazole antimicrobials, *Clin Pharmacokinet*, 36(5):353-73, (1999).
- Larsen T, Susceptibility of *Porphyromonas gingivalis* in biofilms to amoxicillin, doxycycline and metronidazole, *Oral Microbiol Immunol*, 17(5):267-71, (2002).
- Leardi R, Experimental design in chemistry: a tutorial, *Analytica chimica acta*, *Anal Chim Acta*, 652(1):161-72, (2009).

- Leong J-Y, Lam W-H, Ho K-W, Voo W-P, Lee MF-X, Lim H-P, *et al.*, Advances in fabricating spherical alginate hydrogels with controlled particle designs by ionotropic gelation as encapsulation systems, *Particuology*, 24:44-60, (2016).
- Li C, Li C, Liu Z, Li Q, Yan X, Liu Y, *et al.*, Enhancement in bioavailability of ketorolac tromethamine via intranasal in situ hydrogel based on poloxamer 407 and carrageenan, *Int J Pharm*, 474(1):123-33, (2014).
- Li J, Huang Q, Rheological properties of chitosan–tripolyphosphate complexes: From suspensions to microgels, *Carbohydr Polym*, 87(2):1670-7, (2012).
- Li P, Dai Y-N, Zhang J-P, Wang A-Q, Wei Q, Chitosan-alginate nanoparticles as a novel drug delivery system for nifedipine, *Int J Biomed Sci*, 4(3):221-8, (2008).
- Li P-W, Wang G, Yang Z-M, Duan W, Peng Z, Kong L-X, *et al.*, Development of drug-loaded chitosan-vanillin nanoparticles and its cytotoxicity against HT-29 cells, *Drug Deliv*, 23(1):30-5, (2016).
- Li X, Kolltveit KM, Tronstad L, Olsen I, Systemic diseases caused by oral infection, *Clin Microbiol Rev*, 13(4):547-58, (2000).
- Li X, Kong X, Shi S, Zheng X, Guo G, Wei Y, *et al.*, Preparation of alginate coated chitosan microparticles for vaccine delivery, *BMC Biotechnol*, 8(1):1-8, (2008).
- Li Y, Hu M, Du Y, Xiao H, McClements DJ, Control of lipase digestibility of emulsified lipids by encapsulation within calcium alginate beads, *Food Hydrocoll*, 25(1):122-30, (2011).
- Lihong W, Xin C, Yongxue G, Yiyang B, Gang C, Thermoresponsive ophthalmic poloxamer/tween/carbopol in situ gels of a poorly water-soluble drug fluconazole: preparation and in vitro–in vivo evaluation, *Drug Dev Ind Pharm*, 40(10):1402-10, (2014).
- Lim L, Wan LS, Thai P, Chitosan microspheres prepared by emulsification and ionotropic gelation, *Drug Dev Ind Pharm*, 23(10):981-5, (1997).
- Liu L-S, Liu S-Q, Ng SY, Froix M, Ohno T, Heller J, Controlled release of interleukin-2 for tumour immunotherapy using alginate/chitosan porous microspheres, *J Control Release*, 43(1):65-74, (1997).
- Loesche W, The antimicrobial treatment of periodontal disease: changing the treatment paradigm, *Crit Rev Oral Biol Med*, 10(3):245-75, (1999).
- Lopes M, Abraham B, Veiga F, Seica R, Cabral LM, Arnaud P, *et al.*, Preparation methods and applications behind alginate-based particles, *Expert Opin Drug Deliv*, 14(6):769-82, (2017).
- Lund W, The pharmaceutical codex, Principles and Practice of Pharmaceutics, 12th Edition, London, 2-30, (1994).

- Ma N, Xu L, Wang Q, Zhang X, Zhang W, Li Y, *et al.*, Development and evaluation of new sustained-release floating microspheres, *Int J Pharm*, 358(1):82-90, (2008).
- Ma S, Chen Z, Qiao F, Sun Y, Yang X, Deng X, *et al.*, Guided bone regeneration with tripolyphosphate cross-linked asymmetric chitosan membrane, *J Dent*, 42(12):1603-12, (2014).
- Maheshwari M, Miglani G, Mali A, Paradkar A, Yamamura S, Kadam S, Development of tetracycline-serratiopeptidase-containing periodontal gel: formulation and preliminary clinical study, *AAPS PharmSciTech*, 7(3):E162-E71, (2006).
- Marcenes W, Kassebaum NJ, Bernabé E, Flaxman A, Naghavi M, Lopez A, *et al.*, Global burden of oral conditions in 1990-2010: a systematic analysis, *J Dent Res*, 92(7):592-7, (2013).
- Marques MR, Loebenberg R, Almukainzi M, Simulated biological fluids with possible application in dissolution testing, *Dissolut Technol*, 18(3):15-28, (2011).
- Martinez A, Arana P, Fernández A, Olmo R, Teijón C, Blanco M, Synthesis and characterisation of alginate/chitosan nanoparticles as tamoxifen controlled delivery systems, *J Microencapsul*, 30(4):398-408, (2013).
- McCulloch C, Birek P, Overall C, Aitken S, Lee W, Kulkarni G, Randomized controlled trial of doxycycline in prevention of recurrent periodontitis in high-risk patients: antimicrobial activity and collagenase inhibition, *J Clin Periodontol*, 17(9):616-22, (1990).
- Mennini N, Furlanetto S, Cirri M, Mura P, Quality by design approach for developing chitosan-Ca-alginate microspheres for colon delivery of celecoxib-hydroxypropyl- β -cyclodextrin-PVP complex, *Eur J Pharm Biopharm*, 80(1):67-75, (2012).
- Mi FL, Shyu SS, Lee ST, Wong TB, Kinetic study of chitosan-tripolyphosphate complex reaction and acid-resistive properties of the chitosan-tripolyphosphate gel beads prepared by in-liquid curing method, *J Polym Sci B Polym Phys*, 37(14):1551-64, (1999).
- Mi F-L, Tan Y-C, Liang H-F, Sung H-W, In vivo biocompatibility and degradability of a novel injectable-chitosan-based implant, *Biomaterials*, 23(1):181-91, (2002).
- Mirzaei B E, Ramazani S. A A, Shafiee M, Danaei M, Studies on Glutaraldehyde Crosslinked Chitosan Hydrogel Properties for Drug Delivery Systems, *Int J Polym Mater Journal*, 62(11):605-11, (2013).
- Mishra B, Mishra M, Yadav SK, Antibacterial Loaded Spray Dried Chitosan Polyelectrolyte Complexes as Dry Powder Aerosol for the Treatment of Lung Infections, *Iranian J Pharm Res*, 16(1):74, (2017).

- Mishra B, Singh AK, Yadav SK, Study of comparative aspects of gastroretentive delivery of cefixime trihydrate from microspheres and microsphere based tablets, *Int J Pharm Investig*, 45(6):541-54, (2015).
- Mishra B, Yadav S, Periodontal Diseases and Periosteal Diseases, *Austin Therapeutics*, 2(2):1-2, (2015).
- Mladenovska K, Raicki R, Janevik E, Ristoski T, Pavlova M, Kavrakovski Z, *et al.*, Colon-specific delivery of 5-aminosalicylic acid from chitosan-Ca-alginate microparticles, *Int J Pharm*, 342(1):124-36, (2007).
- Moran J, Addy M, Wade W, Newcombe R, The use of antimicrobial acrylic strips in the non-surgical management of chronic periodontitis, *Clinical Materials*, 6(2):123-35, (1990).
- Morsi N, Ghorab D, Refai H, Teba H, Ketorolac tromethamine loaded nanodispersion incorporated into thermosensitive in situ gel for prolonged ocular delivery, *Int J Pharm*, 506(1-2):57-67, (2016).
- Moura LA, Ribeiro FV, Aiello TB, Duek EADR, Sallum EA, Nociti Junior FH, *et al.*, Characterization of the release profile of doxycycline by PLGA microspheres adjunct to non-surgical periodontal therapy, *J Biomater Sci Polym Ed*, 26(10):573-84, (2015).
- Müller HP, Holderrieth S, Burkhardt U, Höffler U, In vitro antimicrobial susceptibility of oral strains of *Actinobacillus actinomycetemcomitans* to seven antibiotics, *J Clin Periodontol*, 29(8):736-42, (2002).
- Mundargi RC, Srirangarajan S, Agnihotri SA, Patil SA, Ravindra S, Setty SB, *et al.*, Development and evaluation of novel biodegradable microspheres based on poly (d, l-lactide-co-glycolide) and poly (ϵ -caprolactone) for controlled delivery of doxycycline in the treatment of human periodontal pocket: in vitro and in vivo studies, *J Control Release*, 119(1):59-68, (2007).
- Nair SC, Anoop K, Intraperiodontal pocket: An ideal route for local antimicrobial drug delivery, *J Adv Pharm Technol Res*, 3(1):9, (2012).
- Nasra MM, Khiri HM, Hazzah HA, Abdallah OY, Formulation, in-vitro characterization and clinical evaluation of curcumin *in-situ* gel for treatment of periodontitis, *Drug Deliv*, 24(1):133-42, (2017).
- Nayak UY, Gopal S, Mutalik S, Ranjith AK, Reddy MS, Gupta P, *et al.*, Glutaraldehyde cross-linked chitosan microspheres for controlled delivery of Zidovudine, *J Microencapsul*, 26(3):214-22, (2009).
- Nihant N, Grandfils C, Jérôme R, Teyssié P, Microencapsulation by coacervation of poly (lactide-co-glycolide) IV, Effect of the processing parameters on coacervation and encapsulation, *J Control Release*, 35(2-3):117-25, (1995).

- Noppakundilograt S, Piboon P, Graisuwan W, Nuisin R, Kiatkamjornwong S, Encapsulated eucalyptus oil in ionically cross-linked alginate microcapsules and its controlled release, *Carbohydr Polym*, 131:23-33, (2015).
- Nordström D, Lindy O, Lauhio A, Sorsa T, Santavirta S, Konttinen YT, Anti-collagenolytic mechanism of action of doxycycline treatment in rheumatoid arthritis, *Rheumatol Int*, 17(5):175, (1998).
- Ogrendik M, Treatment of rheumatoid arthritis with ornidazole: a randomized, double-blind, placebo-controlled study, *Rheumatol Int*, 26(12):1132-7, (2006).
- Oh TJ, Eber R, Wang HL, Periodontal diseases in the child and adolescent, *J Clin Periodontol*, 29(5):400-10, (2002).
- Opdyke D, Monographs on fragrance raw materials; Vanillin, *Food Cosmet Toxicol*, 15(6):633-8, (1977).
- Oren B, Schgurensky E, Ephros M, Tamir I, Raz R, Single-dose ornidazole versus seven-day metronidazole therapy of giardiasis in Kibbutzim children in Israel, *Eur J Clin Microbiol Infect Dis*, 10(11):963-5, (1991).
- Palumbo A, The anatomy and physiology of the healthy periodontium, gingival diseases - their aetiology, prevention and treatment, Dr. Fotinos Panagakos (Ed.), InTech INTECH Open Access Publisher, (2011).
- Pandey G, Yadav SK, Mishra B, Preparation and characterization of isoniazid and lamivudine co-loaded polymeric microspheres, *Artif Cells Nanomed Biotechnol*. 44(8):1867-77, (2016).
- Papadimitriou S, Bikiaris D, Avgoustakis K, Karavas E, Georarakis M, Chitosan nanoparticles loaded with dorzolamide and pramipexole, *Carbohydr Polym*, 73(1):44-54, (2008).
- Paquette DW, Locally administered antimicrobials for the management of periodontal infection, *Dent Today*, 28(2):97-8, (2009).
- Pasparakis G, Bouropoulos N, Swelling studies and in vitro release of verapamil from calcium alginate and calcium alginate-chitosan beads, *Int J Pharm*, 323(1):34-42, (2006).
- Patel P, Mundargi RC, Babu VR, Jain D, Rangaswamy V, Aminabhavi TM, Microencapsulation of doxycycline into poly (lactide-co-glycolide) by spray drying technique: Effect of polymer molecular weight on process parameters, *J Appl Polym Sci*, 108(6):4038-46, (2008).
- Patel P, Roy A, Kulkarni M, Formulation and evaluation of colon targeted tablets of Ornidazole for the treatment of amoebiasis, *Int J Drug Dev & Res*, 3(1):52-61, (2011).

- Patel VM, Prajapati BG, Patel HV, Patel KM, Mucoadhesive bilayer tablets of propranolol hydrochloride, *AAPS PharmSciTech*, 8(3):E203-E8, (2007).
- Pati F, Adhikari B, Dhara S, Development of chitosan-tripolyphosphate fibers through pH dependent ionotropic gelation, *Carbohydr Res*, 346(16):2582-8, (2011).
- Pei HN, Chen XG, Li Y, Zhou HY, Characterization and ornidazole release in vitro of a novel composite film prepared with chitosan/poly (vinyl alcohol)/alginate, *J Biomed Mater Res Part A*, 85(2):566-72, (2008).
- Peng H, Xiong H, Li J, Xie M, Liu Y, Bai C, *et al.*, Vanillin cross-linked chitosan microspheres for controlled release of resveratrol, *Food Chem*, 121(1):23-8, (2010).
- Peppas NA, Khare AR, Preparation, structure and diffusional behavior of hydrogels in controlled release, *Adv Drug Deliv Rev*, 11(1-2):1-35, (1993).
- Phaechamud T, Chanyaboonsub N, Setthajindalert O, Doxycycline hyclate-loaded bleached shellac in situ forming microparticle for intraperiodontal pocket local delivery, *Eur J Pharm Sci*, 93:360-70, (2016).
- Phaechamud T, Setthajindalert O, Cholesterol in situ forming gel loaded with doxycycline hyclate for intra-periodontal pocket delivery, *Eur J Pharm Sci*, 99:258-65, (2017).
- Pichayakorn W, Boonme P, Evaluation of cross-linked chitosan microparticles containing metronidazole for periodontitis treatment, *Mater Sci Eng C*, 33(3):1197-202, (2013).
- Pihlstrom BL, Michalowicz BS, Johnson NW, Periodontal diseases, *The Lancet*, 366(9499):1809-20, (2005).
- Pischon N, Heng N, Bernimoulin J-P, Kleber B-M, Willich S, Pischon T, Obesity, inflammation, and periodontal disease, *J Dent Res*, 86(5):400-9, (2007).
- Pitto-Barry A, Barry NP, Pluronic® block-copolymers in medicine: from chemical and biological versatility to rationalisation and clinical advances, *Poly Chem*, 5(10):3291-7, (2014).
- Poncelet D, De Smet BP, Beaulieu C, Huguet M, Fournier A, Neufeld R, Production of alginate beads by emulsification/internal gelation. II, Physicochemistry, *Appl Microbiol Biotechnol*, 43(4):644-50, (1995).
- Poncelet D, Lencki R, Beaulieu C, Halle J, Neufeld R, Fournier A, Production of alginate beads by emulsification/internal gelation. I. Methodology, *Appl Microbiol Biotechnol*, 38(1):39-45, 1992.
- Pradeep A, Kalra N, Priyanka N, Khaneja E, Naik SB, Singh SP, Systemic ornidazole as an adjunct to non-surgical periodontal therapy in the treatment of chronic

- periodontitis: a randomized, double-masked, placebo-controlled clinical trial, *J Periodontol*, 83(9):1149-54, (2012).
- Qi H, Li L, Huang C, Li W, Wu C, Optimization and physicochemical characterization of thermosensitive poloxamer gel containing puerarin for ophthalmic use, *Chem Pharm Bull*, 54(11):1500-7, (2006).
- Ramachandran S, Nandhakumar S, Dhanaraju MD, Formulation and characterization of glutaraldehyde cross-linked chitosan biodegradable microspheres loaded with famotidine, *Trop J Pharm Res*, 10(3):309-16, (2011).
- Rao SK, Setty S, Acharya AB, Thakur SL, Efficacy of locally-delivered doxycycline microspheres in chronic localized periodontitis and on *Porphyromonas gingivalis*, *J Investig Clin Dent*, 3(2):128-34, (2012).
- Raval JP, Naik DR, Amin KA, Patel PS, Controlled-release and antibacterial studies of doxycycline-loaded poly (ϵ -caprolactone) microspheres, *J Saudi Chem Soc*, 18(5):566-73, (2014).
- Ravindra C, Deepak K, Saraswati M, Gani R, Preparation and Characterization of Binary Blend Films Containing Chitosan and Vanillin, *Adv Drug Deliv Rev*, 3(2):181-95, (2015).
- Remunan-Lopez C, Bodmeier R, Mechanical, water uptake and permeability properties of crosslinked chitosan glutamate and alginate films, *J Control Release*, 44(2):215-25, (1997).
- Ribeiro AJ, Silva C, Ferreira D, Veiga F, Chitosan-reinforced alginate microspheres obtained through the emulsification/internal gelation technique, *Eur J Pharm Sci*, 25(1):31-40, (2005).
- Ricci E, Lunardi L, Nanclares D, Marchetti J, Sustained release of lidocaine from Poloxamer 407 gels, *Int J Pharm*, 288(2):235-44, (2005).
- Roskos K, Fritzing B, Rao S, Armitage G, Heller J, Development of a drug delivery system for the treatment of periodontal disease based on bioerodible poly (ortho esters), *Biomaterials*, 16(4):313-7, (1995).
- Rossignol J, Maisonneuve H, Cho Y, Nitroimidazoles in the treatment of trichomoniasis, giardiasis, and amebiasis, *Int J Clin Pharmacol The*, 22(2):63-72, (1984).
- Rowe RC, Sheskey PJ, Quinn ME, Handbook of Pharmaceutical Excipients, sixth edition: *Pharmaceutical Press American Pharmacists Association*, (2009).
- Ryan ME, Host modulation: conceptualization to clinical trials and integration into clinical practice, *J Calif Dent Assoc*, 30(4):285-8, (2002).

- Salvi GE, Mombelli A, Mayfield L, Rutar A, Suvan J, Garrett S, *et al.*, Local antimicrobial therapy after initial periodontal treatment, *J Clin Periodontol*, 29(6):540-50, (2002).
- Sarmiento B, Ferreira D, Veiga F, Ribeiro A, Characterization of insulin-loaded alginate nanoparticles produced by ionotropic pre-gelation through DSC and FTIR studies, *Carbohydr Polym*, 66(1):1-7, (2006).
- Savic IM, Marinkovic VD, Tasic L, Krajnovic D, Savic IM, From experimental design to quality by design in pharmaceutical legislation, *Accredit Qual Assur*, 17(6):627-33, (2012).
- Schmolka IR, Artificial skin I, Preparation and properties of pluronic F-127 gels for treatment of burns, *J Biomed Mater Res*, 6(6):571-82, (1972).
- Schwach-Abdellaoui K, Vivien-Castioni N, Gurny R, Local delivery of antimicrobial agents for the treatment of periodontal diseases, *Eur J Pharm Biopharm*, 50(1):83-99, (2000).
- Şenel S, İkinci G, Kaş S, Yousefi-Rad A, Sargon M, Hincal A, Chitosan films and hydrogels of chlorhexidine gluconate for oral mucosal delivery, *Int J Pharm*, 193(2):197-203, (2000).
- Seshadri PR, Viswanathan K, Periosteutics-Where do we stand?, *Indian J Multidiscip Dent*, 5(1):15, (2015).
- Seymour G, Ford P, Cullinan M, Leishman S, Yamazaki K, Relationship between periodontal infections and systemic disease, *Clin Microbiol Infect*, 13(s4):3-10, (2007).
- Shanmuganathan S, Shanumugasundaram N, Adhirajan N, Ramyaa Lakshmi TS, Babu M, Preparation and characterization of chitosan microspheres for doxycycline delivery, *Carbohydr Polym*, 73(2):201-11, (2008).
- Shao J, Chow S-C, Drug shelf-life estimation, *Statistica Sinica*, 11:737-45, (2001).
- Shen N, Hu J, Zhang L, Zhang L, Sun Y, Xie Y, *et al.*, Doxorubicin-loaded zein in situ gel for interstitial chemotherapy of colorectal cancer, *Acta Pharm Sin B*, 2(6):610-4, (2012).
- Shu X, Zhu K, A novel approach to prepare tripolyphosphate/chitosan complex beads for controlled release drug delivery, *Int J Pharm*, 201(1):51-8, (2000).
- Shu X, Zhu K, Chitosan/gelatin microspheres prepared by modified emulsification and ionotropic gelation, *J Microencapsul*, 18(2):237-45, (2001).
- Shukla D, Chakraborty S, Singh S, Mishra B, Pastillation: a novel technology for development of oral lipid based multiparticulate controlled release formulation, *Powder Techn*, 209(1):65-72, (2011).

- Singh B, Kumar R, Ahuja N, Optimizing drug delivery systems using systematic" design of experiments" Part I: fundamental aspects, *Crit Rev Ther Drug Carrier Syst*, 22(1):27-105, (2005).
- Singh P, Mittal R, Sharma G, Singh S, Singh A, Ornidazole: comprehensive profile, *Profiles Drug Subst Excip Relat Methodol*, 30:123-84, (2003).
- Singh S, Shah V, Dagrus K, Bs Manjunatha KP, Shah S, Oral health inequality and barriers to oral health care in India, *Eur J Dent Ther Res*, 4:242-5, (2015).
- Sinha V, Singla A, Wadhawan S, Kaushik R, Kumria R, Bansal K, *et al.*, Chitosan microspheres as a potential carrier for drugs, *Int J Pharm*, 274(1):1-33, (2004).
- Smith AW, Biofilms and antibiotic therapy: is there a role for combating bacterial resistance by the use of novel drug delivery systems?, *Adv Drug Deliv Rev*, 57(10):1539-50, (2005).
- Smith V, Cook S, Doxycycline-a role in ocular surface repair, *Br J Ophthalmol*, 88(5):619-25, (2004).
- Soares MFdLR, Soares-Sobrinho JL, de Silva KER, Alves LDS, Lopes PQ, Correia LP, *et al.*, Thermal characterization of antimicrobial drug ornidazole and its compatibility in a solid pharmaceutical product, *J Therm Anal Calorim*, 104(1):307-13, (2011).
- Songsurang K, Praphairaksit N, Siraleartmukul K, Muangsin N, Electrospray fabrication of doxorubicin-chitosan-tripolyphosphate nanoparticles for delivery of doxorubicin, *Arch Pharm Res*, 34(4):583-92, (2011).
- Southard GL, Godowski KC, Subgingival controlled release of antimicrobial agents in the treatment of periodontal disease, *Int J Antimicrob Agents*, 9(4):239-53, (1998).
- Sriamornsak P, Thirawong N, Korkerd K, Swelling, erosion and release behavior of alginate-based matrix tablets, *Eur J Pharm Biopharm*, 66(3):435-50, (2007).
- Stroescu M, Stoica-Guzun A, Jipa IM, Vanillin release from poly (vinyl alcohol)-bacterial cellulose mono and multilayer films, *J Food Eng*, 114(2):153-7, (2013).
- Takigawa T, Endo Y, Effects of glutaraldehyde exposure on human health, *J Occup Health*, 48(2):75-87, (2006).
- Talasz AH, Ghahremankhani AA, Moghadam SH, Malekshahi MR, Atyabi F, Dinarvand R, In situ gel forming systems of poloxamer 407 and hydroxypropyl cellulose or hydroxypropyl methyl cellulose mixtures for controlled delivery of vancomycin, *J Appl Polym Sci*, 109(4):2369-74, (2008).
- Tsirigotis-Maniecka M, Gancarz R, Wilk KA, Preparation and characterization of sodium alginate/chitosan microparticles containing esculin, *Colloids Surf A; Physicochem Eng*, 510:22-32, (2016).

- Tye H, Application of statistical 'design of experiments' methods in drug discovery, *Drug Discov Today*, 9(11):485-91, (2004).
- Vardhan H, Mittal P, Adena SKR, Mishra B, Long-circulating polyhydroxybutyrate-co-hydroxyvalerate nanoparticles for tumor targeted docetaxel delivery: Formulation, optimization and in vitro characterization, *Eur J Pharm Sci*, 99:85-94, (2017).
- Vargas-Estrada D, Gracia-Mora J, Sumano H, Pharmacokinetic study of an injectable long-acting parenteral formulation of doxycycline hyclate in calves, *Res Vet Sci*, 84(3):477-82, (2008).
- Verdugo F, Laksmana T, Uribarri A, Systemic antibiotics and the risk of superinfection in peri-implantitis, *Arch Oral Biol*, 64:39-50, (2016).
- Walke S, Srivastava G, Nikalje M, Doshi J, Kumar R, Ravetkar S, *et al.*, Fabrication of chitosan microspheres using vanillin/TPP dual crosslinkers for protein antigens encapsulation, *Carbohydr Polym*, 128:188-98, (2015).
- Walker CB, Selected antimicrobial agents: mechanisms of action, side effects and drug interactions, *Periodontol 2000*, 10(1):12-28, (1996).
- Walton NJ, Mayer MJ, Narbad A, Vanillin, *Phytochemistry*, 63(5):505-15, (2003).
- Wang G, Li PW, Peng Z, Huang MF, Kong LX, editors, Formulation of vanillin cross-linked chitosan nanoparticles and its characterization, *Adv Mat Res Trans*, 335-336:474-477, (2011).
- WHO, World Health Organization: Oral health, 2012, Accessed on 28.02.2016, Available from: <http://www.who.int/mediacentre/factsheets/fs318/en/index.html>.
- Wüst J, Susceptibility of anaerobic bacteria to metronidazole, ornidazole, and tinidazole and routine susceptibility testing by standardized methods, *Antimicrob Agents Chemother*, 11(4):631-7, (1977).
- Xie W, Wang J, Immobilized lipase on magnetic chitosan microspheres for transesterification of soybean oil, *Biomass Bioenergy*, 36:373-80, (2012).
- Xu Y, Wei W, A comparative study of systemic subantimicrobial and topical treatment of minocycline in experimental periodontitis of rats, *Arch Oral*, 51(9):794-803, (2006).
- Xu Y, Zhan C, Fan L, Wang L, Zheng H, Preparation of dual crosslinked alginate-chitosan blend gel beads and in-vitro controlled release in oral site-specific drug delivery system, *Int J Pharm*, 336(2):329-37, (2007).
- Yadav SK, Khan G, Bansal M, Vardhan H, Mishra B, Screening of ionically crosslinked chitosan-tripolyphosphate microspheres using Plackett-Burman factorial design for the treatment of intrapocket infections. *Drug Dev Ind Pharm*, 43:1801-16, (2017a).

- Yadav SK, Khan G, Bonde GV, Bansal M, Mishra B, Design, optimization and characterizations of chitosan fortified calcium alginate microspheres for the controlled delivery of dual drugs, *Artif Cells Nanomed Biotechnol*, 1-14, (2017b).
- Yadav SK, Khan G, Mishra B, Advances in patents related to intrapocket technology for the management of periodontitis, *Recent Pat Drug Deliv Formul*, 9(2):129-45, (2015).
- Yadav SK, Khan ZA, Mishra B, Impact of nanotechnology on socio-economic aspects: An overview, *Reviews Nanosci Nanotech*, 2(2):127-42, (2013).
- Yadav SK, Mishra B, Preformulation studies on combination of ornidazole and doxycycline in pharmaceutical dosage forms: Infra-red spectroscopy and simultaneous ultra-violet method development, *J Chem Pharm Res*, 8(8):564-73, (2016).
- Yadav SK, Mishra S, Mishra B, Eudragit-based nanosuspension of poorly water-soluble drug: formulation and in vitro-in vivo evaluation, *AAPS PharmSciTech*, 13(4):1031-44, (2012).
- Yang C-Y, Hsu C-H, Tsai M-L, Effect of crosslinked condition on characteristics of chitosan/tripolyphosphate/genipin beads and their application in the selective adsorption of phytic acid from soybean whey, *Carbohydr Polym*, 86(2):659-65, (2011).
- Yang Z, Zeng Z, Xiao Z, Ji H, Preparation and controllable release of chitosan/vanillin microcapsules and their application to cotton fabric, *Flavour Fragr J*, 29(2):114-20, (2014).
- Yong CS, Choi JS, Quan Q-Z, Rhee J-D, Kim C-K, Lim S-J, *et al.*, Effect of sodium chloride on the gelation temperature, gel strength and bioadhesive force of poloxamer gels containing diclofenac sodium, *Int J Pharm*, 226(1):195-205, (2001).
- Yuan Y, Chesnutt BM, Utturkar G, Haggard WO, Yang Y, Ong JL, *et al.*, The effect of cross-linking of chitosan microspheres with genipin on protein release, *Carbohydr Polym*, 68(3):561-7, (2007).
- Yuan Y, Cui Y, Zhang L, Zhu H-p, Guo Y-S, Zhong B, *et al.*, Thermosensitive and mucoadhesive in situ gel based on poloxamer as new carrier for rectal administration of nimesulide, *Int J Pharm*, 430(1):114-9, (2012).
- Zaki NM, Awad GA, Mortada ND, El Hady SSA, Enhanced bioavailability of metoclopramide HCl by intranasal administration of a mucoadhesive in situ gel with modulated rheological and mucociliary transport properties, *Eur J Pharm Sci*, 32(4):296-307, (2007).

- Zeeb B, Saberi AH, Weiss J, McClements DJ, Retention and release of oil-in-water emulsions from filled hydrogel beads composed of calcium alginate: impact of emulsifier type and pH, *Soft Matt*, 11(11):2228-36, (2015).
- Zhang F, Cheng G, Ying X, Emulsion and macromolecules templated alginate based polymer microspheres, *React Functional Polym*, 66(7):712-9, (2006).
- Zhang K, Shi X, Lin X, Yao C, Shen L, Feng Y, Poloxamer-based in situ hydrogels for controlled delivery of hydrophilic macromolecules after intramuscular injection in rats, *Drug Deliv*, 22(3):375-82, (2015).
- Zhang Y, Shi X, Yu Y, Zhao S, Song H, Chen A, *et al.*, Preparation and characterization of vanillin cross-linked chitosan microspheres of pterostilbene, *Int J Polym Anal Charact*,19(1):83-93, (2014).
- Zhang Y, Wei W, Lv P, Wang L, Ma G, Preparation and evaluation of alginate–chitosan microspheres for oral delivery of insulin, *Eur J Pharm Biophar*, 77(1):11-9, (2011).
- Zingale J, Harpenau L, Bruce G, Chambers D, Lundergan W, The effectiveness of scaling and root planing with adjunctive time-release minocycline using an open and closed approach for the treatment of periodontitis, *Gen Dent*, 60(4):300-5, (2011).
- Zou Q, Li J, Li Y, Preparation and characterization of vanillin-crosslinked chitosan therapeutic bioactive microcarriers, *Int J Biol Macromol*, 79:736-47, (2015).

