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Contemporary place of orthodontics in public health improvement in Algeria

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Abstract

Orthodontics and dento-facial orthopedics are fields of modern dentistry that aim to study dental and facial growth, to diagnose malocclusions and to treat them. The orthodontics contribution to public health has been debated by the pioneers of the field in the sixties. However, this subject has reemerged in the last years because of the high demand for orthodontic treatment in modern societies. Word Health Organization recommended that the public policies must support the orthodontics role in health promotion and life quality amelioration. So is there a real impaction of malocclusion and orthodontic treatment on the quality of life? In this paper, we will try to answer this question through 10 clinical cases presentation showing patients who were suffering from malocclusions and teeth crowding before and after treatment. Questionnaires (OHRQoL) were distributed to these patients in order to evaluate their perception of the changes before and after treatment. In conclusion, comfort when eating, sleeping and engaging in social interaction, in self- esteem and satisfaction are usually affected by malocclusions. Orthodontics can help to improve all these aspects of public health in modern societies.

Keywords: Orthodontics, public health, life quality, malocclusion, Algeria.

Introduction

If the earliest description of irregularities of the teeth was given about 400 bc by Hippocrates (ca 460-377 bc), the modern orthodontic appliances description did not appear until the XVIIIth century thanks to Pierre Fauchard in France (1). Since then, the contribution of orthodontics in public health was discussed by clinicians with different backgrounds.

Nowadays, the role of orthodontics in malocclusions diagnosis and treatment is not discussed anymore. In some countries, public health services has been obliged by law to include orthodontics for all ages up to 17 years completely free of charge (2) as a recognition of its place in human health improvement.

For the same reasons, Word Health Organization recommended that the public policies must support the orthodontics role in health promotion and life quality amelioration. In this paper, through 10 clinical cases, the role of orthodontics in quality-of-life improvement is highlighted.

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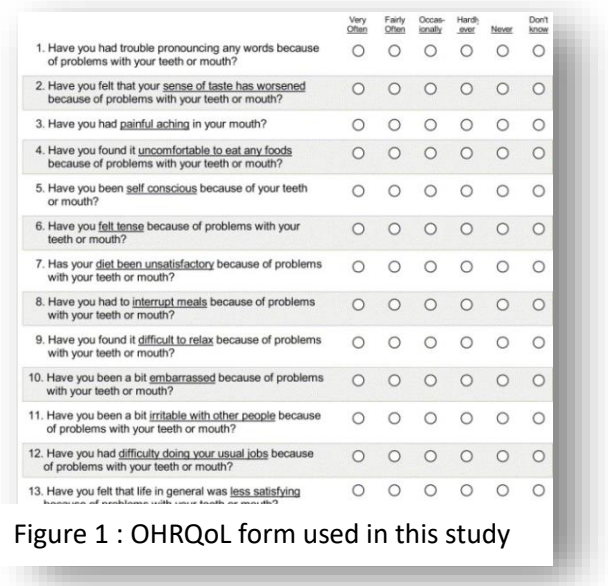
Methods

Our dental department is located in the city of Ouargla (800 Km southeast the capital city of Algeria). Orthodontic care is provided by two orthodontists only in the city. In 2019, 837 orthodontic treatment requests have been received in the department. In the actual study, 10 patients were randomly selected to be presented and to be evaluated by the Oral Health Related Quality of Life (OHRQoL) form (Fig 1) before and after treatment.



	Very Often	Fairly Often	Occas-ionally	Hardly ever	Never	Don't know
1. Have you had trouble pronouncing any words because of problems with your teeth or mouth?	○	○	○	○	○	○
2. Have you felt that your sense of taste has worsened because of problems with your teeth or mouth?	○	○	○	○	○	○
3. Have you had painful aching in your mouth?	○	○	○	○	○	○
4. Have you found it uncomfortable to eat any foods because of problems with your teeth or mouth?	○	○	○	○	○	○
5. Have you been self conscious because of your teeth or mouth?	○	○	○	○	○	○
6. Have you felt tense because of problems with your teeth or mouth?	○	○	○	○	○	○
7. Has your diet been unsatisfactory because of problems with your teeth or mouth?	○	○	○	○	○	○
8. Have you had to interrupt meals because of problems with your teeth or mouth?	○	○	○	○	○	○
9. Have you found it difficult to relax because of problems with your teeth or mouth?	○	○	○	○	○	○
10. Have you been a bit embarrassed because of problems with your teeth or mouth?	○	○	○	○	○	○
11. Have you been a bit irritable with other people because of problems with your teeth or mouth?	○	○	○	○	○	○
12. Have you had difficulty doing your usual jobs because of problems with your teeth or mouth?	○	○	○	○	○	○
13. Have you felt that life in general was less satisfying	○	○	○	○	○	○

Figure 1 : OHRQoL form used in this study

Results

After follow ups varying from 12 months to 24 months depending on the malocclusion severity, the 10 cases showed the following improvements:

Clinical cases:

1. **Case n°1:** B.A 10 year-old girl suffering from early loss of lacteal teeth and early signs of crowding and mandibular retrognathia (Fig 2).

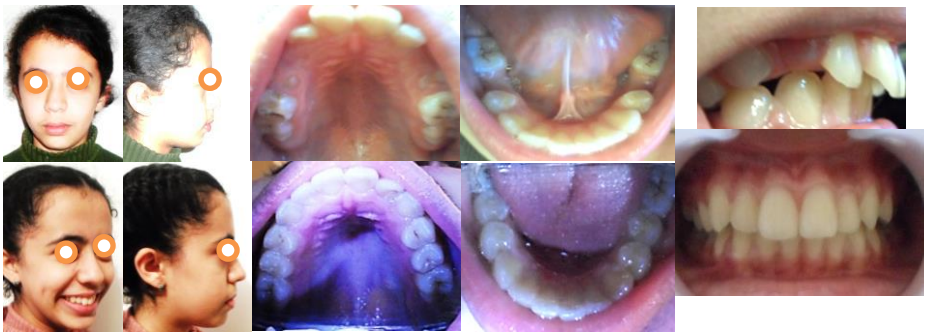


Figure 2 : Clinical case n°1 improvement

2. **Case n°2 :** A.R 10 year-old girl referred for oral breathing signs. After tonsillectomy and nasal breathing learning exercises, the patient recovered and facial growth improved (Fig 3).

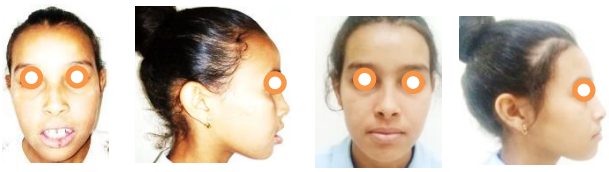


Figure 3 : Clinical case n°2 improvement

3. **Case n°3 :** B.S 9 year-old girl referred to us for retention of the upper incisor. After surgery, the upper incisor has been placed in its correct position improving patient's self-esteem (Fig4).

Figure 4 : Clinical case n°3 improvement

4. **Case n°4 :** B.S 9 year-old girl diagnosed with unilateral mastication syndrome (etiology of facial asymmetry in the adulthood). The early loss of the lacteal teeth on the left side was identified as the main cause. Eruption guidance appliance helped to manage the case in one year (Fig 5).

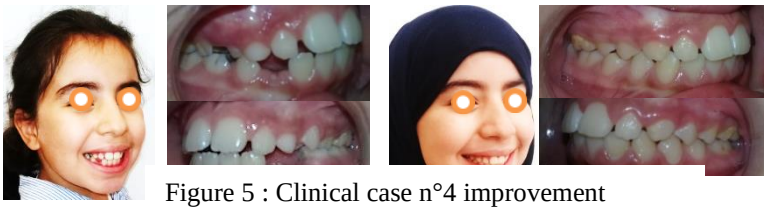


Figure 5 : Clinical case n°4 improvement

5. **Case n°5 :** A.A 11 year-old boy referred to us for upper jaw protrusion. 18 months treatment with fixed appliance allowed to put the upper jaw in correct position according to the lower jaw with an excellent esthetic result (Fig 6).

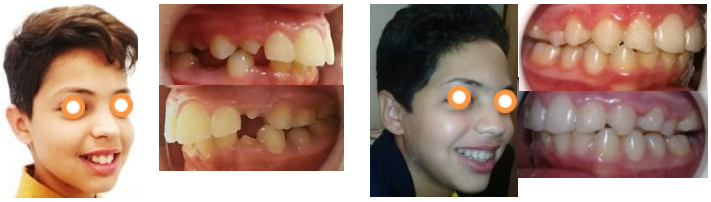


Figure 6 : Clinical case n°5 improvement

6. **Case n°6 :** F.A 11 year-old boy diagnosed as class II/2 malocclusion with dental trauma due to upper incisors protrusion. Preformed activator ameliorated the dental conditions (Fig 7).

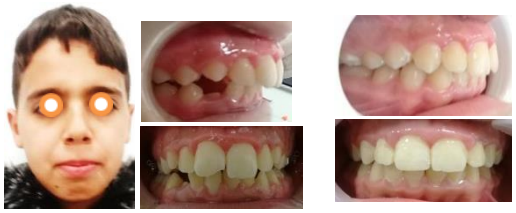


Figure 7 : Clinical case n°6 improvement

7. **Case n°7 :** C.A 7 year-old boy diagnosed with lateral shift of the mandibule. The upper jaw expansion allowed the mandibule to find new references (Fig 8).

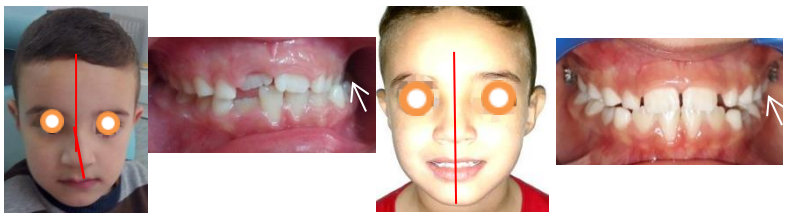


Figure 8 : Clinical case n°7 improvement

8. **Case n°8 :** T.A 12 year-old taking in charge for severe crowding. Fixed appliance with first bicuspids extractions improved the teeth alignment in 24 months (Fig 9).

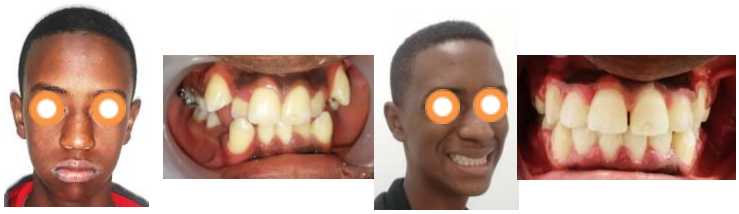


Figure 9 : Clinical case n°8 improvement

9. **Case n°9 :** S.H 12 year-old girl referred to us for estheitc complaint. Fixed appliance ameliorated teeth alignment in 6 months (Fig 10).

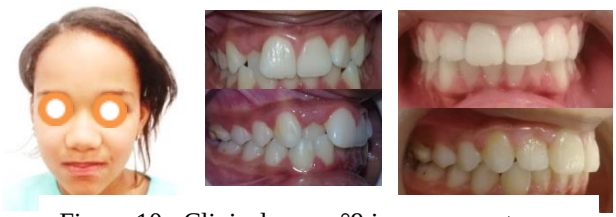


Figure 10 : Clinical case n°9 improvement

10. Case n°10 : L.R 8 year-old girls referred for early signs of cowding. Eruption guidance for 18 months allowed all teeth to take place normally on the two jaws (Fig 11).

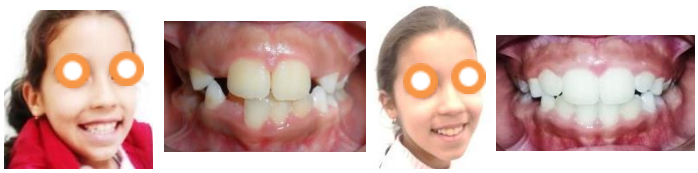


Figure 11 : Clinical case n°10 improvement

A. OHRQoL

The OHRQol form has 14 components from different domains. In the forms received before treatment, malocclusions seem to impact especially self-esteem domains represented by the 5th and the 10th component of the form (Fig 12).

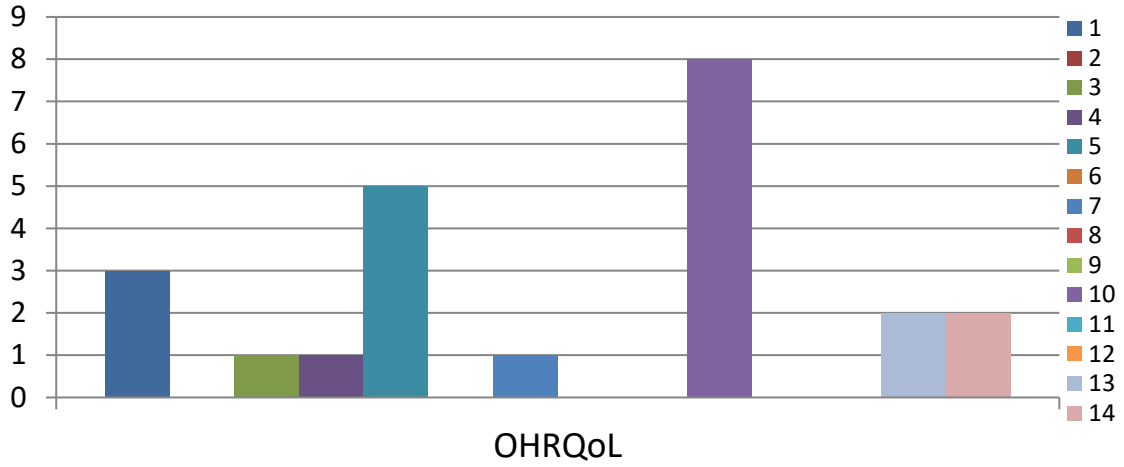


Figure 12 : OHRQoL evaluation results before treatment

Discussion

Children from 8 to 12 years old participated in this pilot study. Different complaints were reported, but the esthetic complaint remains the most frequent. OHRQoL before treatment was marked by high proportion of children felt embarassed (80%) and self-consious (50%) by their teeth condition. The emotional criteria in OHRQol improved following orthodontic treatment of all the patients of the group. Similar results have been reported in the study of Farzanegan et al. (3). They have noticed an amelioration of quality of life at the same time of orthodontic treatment progression. The same findings have been reported by Jaeken et al. (4) in 215 cases study. These facts can be noticed easily by health professionals through the pictures of the presented clinical cases in this paper. Various orthodontic treatments are proposed to achieve the results noticed in these patients.

Eruption guidance appliances have been used in three cases, fixed appliances in three cases and surgery in 2 cases depending on patients' diagnosis. But better stability and functional outcomes were noticed with eruption guidance appliances (when they are indicated). Boukhazani (5) has mentioned these outcomes in a class II/1 malocclusion report.

Conclusion

Orthodontic treatment contribution in the improvement of emotional domains of OHRQol is confirmed in the actual pilot study. It helped also in masticatory function amelioration. The orthodontic care needs to be a part of public health policies especially in children due to its positive impact on both emotional and functional well-being.

References

1. Wahl N. Orthodontics in 3 millennia. Chapter 1: Antiquity to the mid-19(th) century. Am J Orthod Dentofacial Orthop. 2005 Mar 1;127:255–9.
2. Linder-Aronson S. Orthodontics in the Swedish Public Dental Health Service. Eur J Orthod [Internet]. 2007 Apr 1;29(suppl_1):i124–7. Available from: https://doi.org/10.1093/ejo/cjl078
3. Farzanegan F, Heravi F, Ramezani M. Evaluation of health related quality of life changes after initial orthodontic treatment.

Oral Heal Prev Dent. 2015;13(2):143–7.

4. Jaeken K, Cadenas de Llano-Pérula M, Lemiere J, Verdonck A, Fieuws S, Willems G. Reported changes in oral health-related quality of life in children and adolescents before, during, and after orthodontic treatment: a longitudinal study. Eur J Orthod. 2019;41(2):125–32.
5. Boukhazani F. The use of customized trainers in Class II division 1 malocclusion. Int J Dent Sci Innov Res [Internet]. 2019; Available from: www.ijdsir.com

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Role of Microbial Enzymes in Bioremediation of Pollutants : A Review

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Abstract

Emerging pollution is growing more and more due to the indiscriminate and frequently deliberate release of hazardous, harmful substances. Significant destructive impacts of pollutants are perinatal disorders, mortality, respiratory disorders, allergy, cancer, cardiovascular and mental disorders, and other harmful effects. Conventional methods for removing pollutants are not efficient; instead, they lead to the secondary contamination. The significant degradation of pollutants can be upgraded by using biological treatment methods such as bioremediation which is cost effective and nature friendly technology. In the bioremediation process, fungi or bacteria and their enzymes are used to clean and purify pollution. Microbial enzymes released by these microbial bioremediator are used to neutralize pollutants into less harmful products. Some enzymes effectively used in bioremediation are hydrolyses, oxidoreductase, transferase, lyases have been extensively studied. Among all other techniques, these microbial enzymes have been found to be effective in degrading and transforming pollutants into novel useful substances. Thus, microbial enzymes serves a great role in solving the problem of pollution in environment.

Keywords: Bioremediation, Microbial enzyme, Pollutants, Oxidoreductse, Hydrolyase

Introduction

Nowdays the world is facing the problem of pollution in environment like air pollution, water pollution and soil pollution, etc. These severe epidemics are occurring due to many anthropogenic activities like industrialisation, overpopulation, modern agricultural practices. The large array of pollutants causing pollution having different structure and toxicity are hazardous for our earth as well as the living beings. These pollutants have created teratogenic, carcinogenic, mutagenic and toxic effect on living beings. Environmental pollutants are of two types organic and inorganic pollutants; organic pollutants include pesticides, polycyclic hydrocarbons, DDT, hexa-chlorobenzene. Modern agricultural activities are one of the main sources of these organic pollutants (Rhind SM, 2012)

Several methodology has been applied for the remediation of pollution like electrochemical treatment, adsorption of pollutants and membrane filtration but these methods for removing pollutants are not as efficient as they end up forming secondary contaminants and also they are complex and an economical. The drawbacks in these convention methods have focused towards cost effective, natural friendly technology which detoxify and decontaminate the pollutants in effective way and making them harmless.

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Techniques are improving as greater knowledge and experience have gained and there is no doubt that bioremediation has great potential for dealing with certain types of site contamination. Bioremediation is one amongst the pollution management technology that uses some biological system like bacteria, fungi and algae to degrade noxious chemicals into less harmful forms (Karigar & Rao, 2011)

Bioremediation is also termed as biodegradation which involves the microorganism for removing dangers of many pollutants. Microorganisms like bacteria and archaea and fungi are more advantageous than any other remediation process as they restore the natural surroundings and prevent further pollution (K Mackova, 2005)

For bioremediation to be effective microorganisms must enter enzymatically attack the pollutant. Enzymes of the bioremediators play the most crucial role. Enzymes can treat different types of organic and inorganic pollutants as they have been recognised to be competent to transform pollutants at a detectable rate. This article highlights the major enzymes analogous with the bioremediation.

Introduction to enzymes

Enzymes are biological catalyst that help the process of converting substrate into product. It make the condition favourable by reducing the activation energy required. Enzyme is a chain of protein or maybe glycoproteins. An enzyme consists of many regions that facilitate the catalytic reaction called as active sites. The active site make either covalent or non covalent bond with the substrate to catalyse the process. The group of chains formed of proteins and glycoprotein are known as apoenzyme. While the other non protein part is the prosthetic groups which together with apoenzyme from main component holoenzyme.

Moreover enzymes have several advantages as they can catalyse large range of different compounds and may also function for those compounds for which no other technologies have been devised. It is the best part of enzymatic activity that they are not inhibited by the inhibitors and can also function in stressful conditions. They are even effective at low concentration of pollutants which can be easily detected.

Enzymes used in bioremediation could be either in isolated form or in the cell itself. The enzyme have high mobility than micro-organisms because of their small size (Gianfreda, Bollag, 2012)

But if whole microorganism is used in bioremediation, the inoculation and nutrition for them become mandatory. So the use of individual enzymes have more benefits including higher mortality, good specificity, high activity even in toxic condition and also biodegradability (Eibes, Ramos, 2015). All these advantages render enzymatic bioremediation as eco-friendly as well as environmental friendly technology.

As claimed by Alcade et.al, 2006, biocatalysis by enzyme (very often term as White biotechnology) fully participates in the "Green Chemistry" concept. Enzymes are the most efficient biodegradation tools as they facilitate all chemical changes on pollutants. The specificity of enzymes is much broad to act on different compounds having similar structure. The enzymes are much stable and efficient for extreme conditions and also recognise the particular substrate.

Microbial enzymes useful in bioremediation

The microbial enzymes present in the micro-organism used in bioremediation process disrupt the chemical bond of toxic harmful molecules and resulting in reduction of toxicity. Enzymes used as extracellular for biodegradation plays a crucial role than the cell itself. They efficiently utilise the organic polymers since the compound having molecular weight less than 600 daltons can pass through the cell force (Tonkova, 2003)

Table 1: Properties and applications of various microbial enzymes from different microorganisms.

S. No.	Enzymes	Source of Enzyme	Application	Substrate
1.	Laccase	*Pseudomonas putida* F_6	Degradation of Synthetic dyes	Syringaldazine (SGZ)
		Streptomyces cyaneus	Oxidation of micropollutants as BPA, DFC, MFA	2,2' Azino-bis(3, ethylbenzothiazoline, 6-sulphonic acid; ABTS
		Geobacillus thermocatenulatus	Decolourization of textile dyes	ABTS
2.	Cytochrome P 450	*Rhodococcus rhodochorous*	Degradation of RDX	Hexahydro-1,3,5, trinitro-1,3,5, triazine
		Bacillus megaterium	Hydroxylation of PCDDs	Polychloro-dibenzo-p-dioxin (PCDD)
		Mycobacterium	Biodegradation of Morpholine	
3.	Amylase	*Bacillus/ Geobacillus*	Starch liquefaction	Diethylethanolamine (DEAE)
4.	Lipase	*Bacillus subtilis*	Bioremediation of waste water	Olive oil
		Bacillus pumilus	Degradation of palm oil containing industrial waste water	Palm oil
5.	Dehydrogenase	*Pseudomonas putida*	Catabolism of 2,4-xylenol	4- Hydroxybenzaldehyde
		S. rhizophila	Polyvinyl alcohol degradation	Polyvinyl alcohol
6.	Protease	*Bacillus subtilis*	Degradation of casein & feather	Feather culture medium
		Chryseobacterium strain Kr6	Complete degradation of feathers	Cheicken feather
		Streptomyces thermoviolaceus	Hydrolyze fibrin, muscle, collagen, nail & hair	Muscle, Collage, Hair Nail & Feathers
7.	Dehalogenase	*Ancyclobacter aquaticus*	Degradation of halogen acid ester	Monochloroacetate
		Bacillus sp.	Degradation of TBP	2,4,6-Trinitrobromophenol (TBP)
		Pseudomonas sp.	Degradation of Halogen acid	2- Chloropropionate
8.	Peroxidase	*Astromyces ramosus*	Degradation of Phenols, polyaromatics and herbicides	Phenol
		Plant material	Decontamination of water	
9.	Mangenese Peroxidase	*Phanerochaete*	Degradation of lignin, phenol & dyes	Pentachlorophenol
10.	Hydrolase	*Pseudomonas diminuta*	Bioremediation of Organophosphorous compound	Organophosphate

1. Laccase: Laccase is an enzyme containing p diphenyl: dioxygen oxidoreductase and oxidase which is produced by certain fungi, bacteria. Laccase is used as bio catalyst for degradation of many phenolic compounds like polyphenols BPA, PAH which can be easily found in wastewater of dye textile industry. They oxidize the phenolic and aromatic substrate and at the same time reduce molecular oxygen to water (C. Mai, Mistein, 2000)

Laccase is first discovered in fungi species. It is also produced in different bacterial species like Geobacillus, Pseudomonas. Bacterial laccase have more resistivity towards extreme temperature and pH.(PS Chauhan 2017) Laccase is mainly used for bioremediation of Dyes. This enzyme can decolourize the different dyes within a small duration by 80% in the presence of acetosyringone as a mediator (M Zhao, 2012). PAH are xenobiotic pollutants present in chemical constituent of dyes. Laccase can convert the

PAH in less toxic quinine by oxidation and atlast monomerisation process.

2.Cytochrome P450: Cytochrome P450 are a superfamily of heme containing enzymes that catalyse different reaction which are mainly found in bacteria and archaea domain. Bacillus, Mycobacterium are among the genera from which cytochrome P450 is isolated and used for bioremediation as they are easily soluble, low cost production. It catalyse the different reaction like hydroxylation, dealkylation and bio-transform the toxic chemicals present in environment. P450 have an intrinsic capacity to degrade xenobiotics. (Azenbacher, 2001)

Similarly Chakraborty and Das (2016) have reported that several microorganisms such as Rhodococcus, Bacillus, Mycobacterium genomes expressing cytochrome P450 for degradation of POP from environment(Chakraborty and Das 2016). Dioxins, PCB (polychlorinated biphenyls), PCDD are the different pollutants that can be bioremediated by cytochrome P450. Besides transgenic plants that can produce cytochrome P450 are way towards herbicide resistant plant (S. Kumar 2010)

3. Lipase: Lipase is an enzyme that degrade the lipids by catalysing the process of hydrolysis of triglyceride ester bond into fatty acids and glycerol. (L. Godoy, 2012). It have been observed that lipase enzyme is closely associated with bioremediation of organic pollutants by reducing the hydrocarbon. Microbial lipase have broad application in bioremediation of oil residues, petroleum effluent, cosmetic effluents, etc.

Lipase have been extracted from bacteria, actinomycetes mainly from Bacillus and Pseudomonas genera. Lipase is used commercially in biodegradation due to their low energy requirement, maximum stability, broad specificity, etc. Lipase can enhance the bioremediation of soil which is contaminated with industrial waste oil and it also degrade palm oil and castor oil.

4. Dehydrogenase: Dehydrogenase is an enzyme group belongs to the family of oxidoreductase. They are mainly isolated from bacteria, yeast like Pseudomonas, Stenotrophomonas. The microbial dehydrogenase catalyse the conversion of alcohol into aldehyde and Ketone group and ultimately oxidize aldehyde to Carboxylic acid (Nickolas et al, 2003).

5. Protease: Protease belongs to hydrolase family which catalyse the degradation of peptide bonds. They can be isolated from bacteria, fungi etc. mainly Bacillus, Streptomyces genera. Protease hydrolyse the breakdown of protein substances released from as by-product of some industries like poultry, fisheries, leather and Pharmaceuticals. Microbial protease have high commercial application because of their high efficiency, high production and low costing

The protease enzyme, Keratinase has shown significant activity on biodegradation of chicken feathers to clear the waste biomass from Agro sector. The products released from the degradation of feathers are rich in amino acids that can be used as fertilizer for plant growth

6. Dehalogense: Microbial Dehalogenase enzyme has very significant importance in bioremediation process of halogenated pollutants. The halogen compounds are degraded by the dehalogenase enzyme by catalysing the cleavage of Halogen bonds by using 3 different methods like hydrolysis, reduction and oxidation. Dehalogenase enzyme help in replacement of halogen group by the hydroxyl group. (Allpress & Gowland, 1998). Mainly dehalogenase enzyme is isolated from Bacteria, the genera includes Pseudomonas, Ancyclobacter. Zu et al. have isolated a pure strain of Bacillus sp. which has an excellent capacity to decontaminate the 2,4,6- Trinitrobromophenol(TBP). The enzyme debrominate the bond of the TBP and converting it into less harmful form.

7. Peroxidase: Peroxidases (hydrogen peroxide oxidoreductases) are ubiquitous enzymes that catalyze the oxidation of lignin and other phenolic compounds at the expense of hydrogen peroxide (H2O2) in the presence of a mediator. In mammals, they are involved in biological processes such as immune system or hormone regulation. In plants, they are involved in auxin metabolism, lignin and suberin formation, cross-linking of cell wall components, defense against pathogens, or cell elongation (D. Koua et al., 2009). It catalyses the prosses of bioremediation of waste water by degrading the phenolic compounds and polyaromatic compounds that are contaminating the

water. It also reduce the harmful effect of herbicides by oxidation process in the presence of H2O2.

8. Mangenese Peroxidase: Mangenese Peroxidase is an extracellular heme enzyme isolated from the basidiomycetes fungus such as Phanerochaete chrysosporium, Dichomitus squalens. etc. (H.Xu, MV Guo, et al, 2017). This enzyme manganese peroxidase catalyse the process of degrading the harmful phenolic compound like pentachlorophenol used in Dyes industries. It oxidizes Mn2+ to the oxidant Mn3+ in a multistep reaction which act as mediator for the oxidation of various phenolic compounds. MnP is capable of oxidizing nonphenolic structures (A. Hamid, J.O.Soilbaiti, 2013)

9. Hydrolase: Esterases,nitrilases,aminohydrolases, lipase, cutinase, and organophosphorus hydrolase are among the hydrolase enzymes used in the bioremediation of different chemicals such as herbicides, pesticides, organophosphorus compounds, nitrile compounds, and polymers. Hydrolases uses a chemical bond utilizing water and convert the alrge harmful molecules to smaller one so that their toxicity also reduces. This enzyme class's main advantages are ready availability, economical, eco-friendly, lack of cofactor stereo selectivity, and tolerance. Organophosphate (OP) compounds are highly lethal neurotoxins. They have widely used pesticides in agriculture, representing a threat in the biotic environment. The hydrolase enzyme detoxify these organophosphate compounds by hydrolysis, oxidation process and thus bioremediate the contaminated soil.

Conclusion

Biodegradation is very fruitful and attractive option to remediating, cleaning, managing and recovering technique for solving polluted environment through microbial activity. , many pollutants degrading enzymes possess special functions and great application prospects in biocatalysis. . Enzymes as practical tools of living organisms are an ecofriendly and bio-based strategy for bioremediation. Microorganisms exposed to contaminated sites and specific pollutants are fascinating sources for the isolation of active enzymes against those pollutant Thus, many microbes and the related degrading enzymes have been successfully adapted in diverse areas, such as in the preparation of industrial biosensors, intermediates of pharmaceutical progress, medical bioremediation, etc. It is concluded that enzymes would be a promising way to reduce pollutants and make a healthier environment for humans and all other species.

Abbreviations

ABTS: 2,2′-Azino-bis-(3-ethylbenzothiazoline-6sulfonic acid)
APAHs: Polycyclic aromatic hydrocarbons
BPA: Bisphenol
DFC: Diclofenac
MFA: Mefenamic acid
OP: Organophosphates
PCCDS: Polychlorinated di-benzo-p-dioxins
POPs: Persistent organic pollutants SGZ: Syringaldazine
TBP: Trinitro bromo phenol

References

1. J. D. Allpress and P. C. Gowland, "Dehalogenases: environmental defence mechanism and model of enzyme evolution," Biochemical Education, vol. 26, no. 4, pp. 267–276, 1998.
2. M. Villa, E. M. Doyle, and S. Brooks, "Biochemical characterisation of the coexisting tyrosinase and laccase in the soil bacterium Pseudomonas putida F6," Enzyme and Microbial Technology, vol. 40, no. 5, pp. 1435–1441, 2007.
3. Riffel, F. Lucas, P. Heeb, and A. Brandelli, "Characterization of a new keratinolytic bacterium that completely degrades native feather keratin," Archives of Microbiology, vol. 179, no. 4, pp. 258–265, 2003.
4. Verma and P. Shirkot, "Purification and characterization of thermostable laccase from thermophilic geobacillus thermocatenulatus MS5 and its applications in removal of textiledyes,"ScholarsAcademicJournalofBio sciences,vol.7, 2014.
5. Joseph, P. W. Ramteke, and P. A. Kumar, "Studies on the enhanced production of extracellular lipase by Staphylococcus epidermidis," Journal of General and Applied Microbiology, vol. 52, no. 6, pp. 315–320, 2006

6. B.-E. Jugder, H. Ertan, M. Lee, M. Manefield, and C. P. Marquis, "Reductive dehalogenases come of age in biological destruction of organohalides," Trends in Biotechnology, vol. 33, no. 10, pp. 595–610, 2015.
7. Bollag, J.-M., Chu, R., Rao, M. A., Gianfreda, L. 2003. Enzymatic oxidative transformation of chlorophenol mixtures. J. Environ. Qual. 32, 6271.
8. S. Karigar and S. S. Rao, "Role of microbial enzymes in the bioremediation of pollutants: A review," Enzyme Res., vol. 2011, no. 1, 2011, doi: 10.4061/2011/805187.
9. Sharma, B. Sharma, and A. K. Shukla, "Biotechnological approach of microbial lipase: a review," Biotechnology, vol. 10, no. 1, pp. 23–40, 2011. [
10. Demnerova K, Mackova M, Spevakova, V, Beranova K, Kochankova L, et al. (2005) Two approaches to biological decontamination of groundwater and soil polluted by aromatics characterization of microbial populations. International Microbiology 8: 205-211. Link: https://goo.gl/1ahGcu
11. J. Suh and H. K. Lee, "Characterization of a keratinolytic serine protease from Bacillus subtilis KS-1," Journal of Protein Chemistry, vol. 20, no. 2, pp. 165–169, 2001.
12. M. B. Seth-Smith, S. J. Rosser, A. Basran, E. R. Travis, S.NicklinDabbs,andN.C.Bruce,"Cloning,sequencing,and characterization of the hexahydro-1,3,5-trinitro-1,3,5-triazine degradation gene cluster from Rhodococcus rhodochrous,"AppliedandEnvironmentalMicrobiology,vol.68, no. 10, pp. 4764–4771, 2002.
13. H.A.El-Refai,M.A.AbdelNaby,A.Gaballa,M.H.El-Araby, and A. F. Abdel Fattah, "Improvement of the newly isolated Bacillus pumilus FH9 keratinolytic activity," Process Biochemistry, vol. 40, no. 7, pp. 2325–2332, 2005
14. Margot, C. Bennati-Granier, J. Maillard, P. Bl´anquez, D.A.Barry,andC.Holliger,"Bacterialversusfungallaccase: potential for micropollutant degradation," AMB Express, vol. 3, no. 1, p. 63, 2013.
15. J. Q. Liu, T. Kurihara, A. K. Hasan et al., "Purification and characterization of thermostable and nonthermostable 2haloacid dehalogenases with different stereospecificities from Pseudomonas sp. Strain YL," Applied and Environmental Microbiology, vol. 60, no. 7, pp. 2389–2393, 1994
16. J.-K. Yang, Y.-M. Tzeng, and S.-L. Wang, "Production and purification of protease from a Bacillus subtilis that can JournalofChemistry deproteinize crustacean wastes☆"Production and Purification of Protease from a Bacillus Subtilis that Can Deproteinize Crustacean Wastes☆," Enzyme and Microbial Technology, vol. 26, no. 5-6, pp. 406–413, 2000.
17. L. Arregui et al., "Laccases: structure, function, and potential application in water bioremediation," Microb. Cell Fact., vol. 18, no. 1, pp. 1–33, 2019, doi: 10.1186/s12934-019-1248-0.
18. L.Zu,G.Li,T.An,andP.-K.Wong,"Biodegradationkinetics and mechanism of 2,4,6-tribromophenol by Bacillus sp. GZT: a phenomenon of xenobiotic methylation during debromination," Bioresource Technology, vol. 110, pp. 153– 159, 2012.
19. M. Haniya, A. Naaz, A. Sakhawat, S. Amir, H. Zahid, and S. A. Syed, "Optimized production of lipase from Bacillus subtilis PCSIRNL-39," African Journal of Biotechnology, vol. 16, no. 19, pp. 1106–1115, 2017
20. M. L. Dotaniya, K. Aparna, C. K. Dotaniya, M. Singh, and K. L. Regar, "Role of soil enzymes in sustainable crop production," in Enzymes in Food BiotechnologyElsevier, Amsterdam, Netherlands, 2019.
21. M. Villa, E. M. Doyle, and S. Brooks, "Biochemical characterisation of the coexisting tyrosinase and laccase in the soil bacterium Pseudomonas putida F6," Enzyme and Microbial Technology, vol. 40, no. 5, pp. 1435–1441, 2007.

22. N. Bansal and S. S. Kanwar, “Peroxidase(s) in environment protection,” Sci. World J., vol. 2013, 2013, doi: 10.1155/2013/714639.
23. P. S. Chauhan, B. Goradia, and A. Saxena, “Bacterial laccase: recent update on production, properties and industrial applications,” 3 Biotech, vol. 7, no. 5, pp. 1–20, 2017, doi: 10.1007/s13205-017-0955-7.
24. P. Saranya, P. K. Selvi, and G. Sekaran, “Integrated thermophilic enzyme-immobilized reactor and high-rate biological reactors for treatment of palm oil-containing wastewater without sludge production,” Bioprocess and Biosystems Engineering, vol. 42, no. 6, pp. 1053–1064, 2019.
25. P.Nigam,“Microbialenzymeswithspecialcharacteristicsfor biotechnological applications,” Biomolecules, vol. 3, no. 4, pp. 597–611, 2013.
26. R. R. Chitte, V. K. Nalawade, and S. Dey, “Keratinolytic activity from the broth of a feather-degrading thermophilic streptomycesthermoviolaceusstrainSD8,”LettersinApplied Microbiology, vol. 28, no. 2, pp. 131–136, 1999.
27. U. Urzúa, P. J. Kersten, and R. Vicuña, “Manganese peroxidase-dependent oxidation of glyoxylic and oxalic acids synthesized by Ceriporiopsis subvermispora produces extracellular hydrogen peroxide,” Appl. Environ. Microbiol., vol. 64, no. 1, pp. 68–73, 1998, doi: 10.1128/aem.64.1.68-73.1998.
28. W. T. Sulistyaningdyah, J. Ogawa, Q.-S. Li et al., “Metabolismofpolychlorinateddibenzo-p-dioxinsbycytochrome P450 BM-3 and its mutant,” Biotechnology Letters, vol. 26, no. 24, pp. 1857–1860, 2004
29. Y. Wei, J. Fu, J. Wu et al., “Bioinformatics analysis and characterization of highly efficient polyvinyl alcohol (PVA)Degrading enzymes from the novel PVA degrader Stenotrophomonas rhizophila QL-P4,” Applied and Environmental Microbiology, vol. 84, no. 1, 17 pages, Article ID e01898, 2017.
30. Y.-F. Chen, H. Chao, and N.-Y. Zhou, “The catabolism of 2,4-xylenolandp-cresolsharetheenzymesfortheoxidation ofpara-methylgroupinpseudomonasputidaNCIMB9866,” Applied Microbiology and Biotechnology, vol. 98, no. 3, pp. 1349–1356, 2014.
31. Z. Liang, G. Li, B. Mai, H. Ma, and T. An, “Application of a novel gene encoding bromophenol dehalogenase from Ochrobactrum sp. Tin TBBPA degradation,” Chemosphere, vol. 217, pp. 507–515, 2019.
32. Z.Li,Y.Jiang,F.P.Guengerich,L.Ma,S.Li,and W.Zhang, “Engineering cytochrome P450 enzyme systems for biomedical and biotechnological applications,” Journal of Biological Chemistry, vol. 295, no. 3, pp. 833–849, 2020.

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Vaginal Trichomoniasis: A Study of Female Patients Attending Ijebu-Ife General Hospital, Ogun State, Nigeria

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Abstract

Trichomonas vaginalis is an anaerobic, flagellated protozoan parasite and the causative agent of trichomoniasis. Trichomonas vaginalis is thought to be the most common non-viral sexually transmitted infection worldwide. This study investigated the prevalence T. vaginalis infection among female patients age 16-35years attending Ijebu-Ife State Hospital, Ogun State.A cross-sectional descriptive study was conducted among Two hundred (200) female outpatients between the ages of 16-35years attending Ijebu-Ife State Hospital, Ogun State. High vaginal swabs (HVS) and urine samples were collected from consenting female patients and examined for the presence of T. vaginalis using both direct wet mount microscopy and culture. Out of 200 female patients examined, 9(4.5%) and 5(2.5%) were found to be infected with T. vaginalis using High vaginal swabs (HVS) and urine samples respectively. The age group 16-20 years had the highest prevalence of 6(3%) while age group >20 years had the lowest prevalence of 3(1.5%) but the difference was not statistically significant. Results obtained from comparing HVS and urine microscopy in this study showed that HVS had a higher prevalence of 4.5% compared to urine microscopy (2.5%) and the difference in their detection was statistically not significant p=0.0001. These results may be useful for health authorities and protection against sexually transmitted diseases. The higher recovery rate obtained by using HVS microscopy confirms its advantage over urine microscopy. Vaginal trichomoniasis is slightly prevalent among the female patients attending Ijebu-Ife State Hospital, Ogun State.

Keywords: Female patients, HVS, T. vaginalis , Urine microscopy, vaginal trichomoniasis

Introduction

Trichomoniasis is the most prevalent non-viral sexually transmitted infection in the world [1]. Trichomonas vaginalis, the causative agent is a protozoan parasite infecting the urogenital tract of both females and males [2]. It is reported to be 250 million new cases worldwide every year [3] and Trichomoniasis accounts to almost half of curable sexually transmitted infections according to the World Health Organisation [3, 4]. In general, the infection is asymptomatic in men although it can be associated with urethral discharge and dysuria [5], while infected women can have different symptoms consisting in yellowish-green frothy discharge, purities, dysuria, and the strawberry cervix which is recognized by punctuates haemorrhagic lesions [5].

Infection by Trichomonas vaginalis among women can lead to serious complications such as adverse pregnancy outcomes that appear by preterm rupture of membranes, preterm delivery, low birth-weight infants, infertility, and cervical cancer [6]. Moreover, studies have shown an increased risk of HIV

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transmission among individuals infected by T. vaginalis [7]. Trichomonas vaginalis transmission is very heterogeneous and depends on several factors; it is established that socioeconomic status, age, hygiene habits, sexual behaviour, phase of the menstrual cycle, and other concomitant sexually transmitted infection can play a key role on the disease burden [8].

The prevalence and the average duration of Trichomonas infection mainly depend on the health care seeking behaviour of population and their access to health care [9]. Primary prevention of Trichomonas vaginalis infection often relies on health promotion interventions to improve diseases awareness and behaviour change [10]; but male circumcision represents an important means for the prevention of T. vaginalis transmission and several studies have shown that partners of circumcised men are less at risk of acquiring sexually transmitted infections including Trichomoniasis [11, 12]. Oral metronidazole remains the recommended drug regimen for the treatment of trichomoniasis and concurrent treatment of sexual partners is recommended to prevent reinfections [13]. In many settings including Nigeria, patients presenting at primary care units with signs suggestive of STI (urethral discharge, vaginal discharge syndromes) are often being diagnosed and managed presumptively using a syndromic approach based on WHO guidelines [14]. But studies have shown that a syndromic-based approach in some settings may lack sensitivity and specificity and can lead to mismanagement of several STI including trichomoniasis [15, 16]. In addition, biological confirmation of T. vaginalis infection in many primary care units remained at a low level due to lack of appropriate diagnostic tool and community prevalence data remained scarce [17, 18]. Thus, limited data regarding the epidemiology of Trichomoniasis are available especially among at risk population such as women of reproductive age. A better understanding in the epidemiology of T. vaginalis is thus needed and may help shape existing control strategies and treatment practices regarding STI in Nigeria. To overcome these gaps, this research was conducted to provide insight into the prevalence of vaginal trichomoniasis among female patients attending Ijebu-Ife General Hospital, Ogun State, Nigeria.

Materials And Methods

Specimen Collection and Examination

The study population comprises of female patients aged 16-35 years attending Ijebu-Ife General Hospital, Ogun State, Nigeria. A clinical examination of the lower genitourinary tract for signs of infection such as vaginal discharge was carried out by a gynaecologist. Incidental clinical signs, age, marital status and number of sex partners of each of these patients were also noted. High vaginal swab and urine sample were collected from each consenting study participants.

Vaginal exudates were collected using a sterile swab stick aided with sterilized speculum. Wet preparations of the vaginal exudates were made using a drop of normal saline on microscope slide covered with a cover slip and examined immediately under the microscope. Also, each urine specimen was thoroughly mixed and 15mlaliquot was centrifuged at 3,000rpm for 10 minutes. The supernant were discarded and one drop of the sediment was placed on a glass slide and covered with a cover slip. The preparation was examined for the presence of T. vaginalis under the microscope. Trichomonas vaginalis was identified with its characteristic morphology and darting motility movement.

Statistical Analysis

Data were entered into Microsoft excel and analyzed. Proportions were compared by Chi-square ($\chi 2$) with Yates` correction or by Fisher's exact tests using Graphpad Instat of Graphpad software Incorporation USA. A p-value of <0.05 was taken as significant.

Results

During the period of study, 200 female patients attending Ijebu-Ife General Hospital, Ogun State, Nigeria were screened for T. vaginalis. The demographic presentation of the study participants is shown in Table 1. Table 2 shows the prevalence of Trichomonas vaginalis among the female patients based on demographic presentation. The age group 16-20 years had the highest prevalence of 6(3%) while age group >20 years had the lowest prevalence of 3(1.5%) but the difference was not statistically significant (p=0.0001).

The Marital status of the study participants shows that 4 (2%) were infected among the married while 5(2.5%) were infected among the singles but the difference was not statistically significant (p=0.0001).

Based on number of sex partners, 3(1.5%) of those with single partner were infected with T. vaginalis. 5(2.5%) were among those with two sex partners while 1(0.5%) were infected among those with more than three sex partners but the difference was not statistically significant (p=0.0001).

Vaginal discharge, dysuria and irritations were the clinical symptoms noticed among the patients. All the positive patients presented with at least one symptom. Vaginal discharge was the most frequent symptom observed among the patients and it also had the highest positivity rate for T. vaginalis (Table 3). The difference in their clinical manifestation but the difference was not statistically significant (p=0.0001). Table 4 shows the differences in the results obtained from the two different sample sources (HVS and Urine) used in this study. HVS had a prevalence of 9(4.5%) compared to urine microscopy 5(2.5%) and the difference in their detection rate was not statistically significant (p=0.0001).

Table 1: The demographic presentation of the study participants.

Parameters Age	Number of examined female	Percentage (%)	P-value
16-20 years	79	39.5	
>20 years	121	60.5	0.0001
Total	**200**	**100**	
Marital status			
Married	65	32.5	
Single	131	65.5	0.0001
Divorced	04	2.0	
Total	**200**	**100**	
No of sex partners			
One	147	73.5	
Two	51	25.5	0.0001
➢ Three	02	1.0	
Total	**200**	**100**	

Table 2: Prevalence of Trichomonas vaginalis among the female patients based on demographic presentation

Parameters Age	Number of examined female	Positive Samples		P-value
		High vaginal swabs (HVS)	*Urine microscopy*	
16-20 years	79	6(3%)	3(1.5%)	
>20 years	121	3(1.5%)	2 (1%)	0.0001
Total	**200**	**9(4.5%)**	**5(2.5%)**	
Marital status				
Married	65	4(2%)	2(1%)	
Single	131	5(2.5%)	3(1.5%)	0.0001
Divorced	04	--	--	
Total	**200**	**9(4.5%)**	**5(2.5%)**	
No of sex partners				
One	147	3(1.5%)	2(1%)	
Two	51	5(2.5%)	2(1%)	0.0001
➢ Three	02	1(0.5%)	1(0.5%)	
Total	**200**	**9(4.5%)**	**5(2.5%)**	

Table 3: Evaluation of Trichomonas vaginalis among the female patients by Clinical Manifestation (n=200)

Symptoms	Frequency	Positive	Percentage (%)	P-value
Vaginal discharge	27	5	2.5	
Dysuria	19	2	1	0.0001
Irritation	19	2	1	
Total	65	9	4.5	

Table 4: Evaluation of Trichomonas vaginalis among the female patients by Sampling Method

Specimen	Number Examined	Number Positive	P-value
High vaginal swab	200	9(4.5%)	
Urine	200	5(2.5%)	0.0001

Discussion

Trichomonas vaginalis is one of the most common STI in the world but its prevalence is very heterogeneous across countries [19, 20]. In this study, 9(4.5%) of the female patients attending Ijebu-Ife General Hospital, Ogun State were found to have T. vaginalis infection. The prevalence of T. vaginalis in this current study was greater compared with 4.8% obtained by Roger et al. [21] but the disease distribution across age groups remained heterogeneous; female with age range 16-20 years were the most infected population (3%). These findings are inconsistent with data from other studies that showed that 25- to 45-year-old women are at higher risk of being infected by T. vaginalis [22-23]. Trichomoniasis in that age group is more prevalent due to the fact that it is a sexually active and reproductive age group, which is predisposing factor for infection [23]. Thus, strategies aiming at improving disease awareness in this high-risk group are needed to further improve trichomoniasis prevention.

5(2.5%) of the patients infected with trichomoniasis had vaginal discharge, 2(1%) had pain while passing urine while 2(1%) had irritation while passing urine. Greater observation was recorded by Wolner-Hanssen et al. [24] where 42% had vaginal discharge. Several studies have also associated T. vaginalis with symptoms of yellow vaginal discharge and vulva irritation, as well as signs of purulent vaginal discharge, and vulva and vaginal erythema [24].

Currently, the "gold standard" for the diagnosis of trichomoniasis is culture and traditionally, this has been accomplished though cultivation in Diamond's medium, which is not widely available and thus used mainly for research purposes. However, new commercially available cultural methods have been shown to be as good as the traditional research method [25].

The most common means of routine diagnosis still remains microscopy. This study has demonstrated that HVS microscopy has a better detection than urine microscopy. This result agrees with what has been previously shown by other authors [26-27].

The most important available options for prevention and control is through reduction in the community prevalence of the disease. This may be better achieved through routine STI screening in individual and pregnancy especially among the young people. Routine screening for trichomoniasis should be incorporated into antenatal care. At the same time, there is a need to educate the people on the need for good personal hygiene and safe sex practices.

References

1. S. Herbst de Cortina, C. C. Bristow, D. Joseph Davey, and J. D. Klausner, "A systematic review of point of care testing for chlamydia trachomatis, neisseria gonorrhoeae, and trichomonas vaginalis," Infectious Diseases in Obstetrics and Gynecology, vol. 2016, Article ID 4386127, 17 pages, 2016. View at: Publisher Site | Google Scholar
2. M. Mao and H. L. Liu, "Genetic diversity of Trichomonas vaginalis clinical isolates from Henan province in central China," Pathogens and Global Health, vol. 109, no. 5, pp. 242–246, 2015. View at: Publisher Site | Google Scholar
3. WHO, Global Incidence and Prevalence of Selected Curable Sexually Transmitted Infections 2008, World Health Organization, Geneva, Switzerland, 2012.
4. D. F. Harp and I. Chowdhury, "Trichomoniasis: evaluation to execution," European Journal of Obstetrics & Gynecology and Reproductive Biology, vol. 157, no. 1, pp. 3–9, 2011. View at: Publisher Site | Google Scholar
5. M. Arbabi, M. Delavari, Z. Fakhrieh-Kashan, and H. Hooshyar, "Review of trichomonas vaginalis in Iran, based on epidemiological situation," Journal of Reproduction and Infertility, vol. 19, no. 2, pp. 82–88, 2018. View at: Google Scholar
6. R. N. Fichorova, "Impact of T. vaginalis infection on innate immune responses and reproductive outcome," Journal of Reproductive Immunology, vol. 83, no. 1-2, pp. 185–189, 2009. View at: Publisher Site | Google Scholar
7. B. Van Der Pol, C. Kwok, B. Pierre-Louis et al., "Trichomonas vaginalis infection and human immunodeficiency virus acquisition in African women," The Journal of Infectious Diseases, vol. 197, no. 4, pp. 548–554, 2008. View at: Publisher Site | Google Scholar
8. D. F. Grama, L. d. Casarotti, M. G. Morato et al., "Prevalence of Trichomonas vaginalis and risk factors in women treated at public health units in Brazil: a transversal study," Transactions of the Royal Society of Tropical Medicine and Hygiene, vol. 107, no. 9, pp. 584–591, 2013. View at: Publisher Site | Google Scholar
9. E. D. Riley, J. Cohen, S. E. Dilworth et al., "Trichomonas vaginalis infection among homeless and unstably housed adult women living in a resource-rich urban environment," Sexually Transmitted Infections, vol. 92, no. 4, pp. 305–308, 2016. View at: Publisher Site | Google Scholar
10. K. Bouchemal, C. Bories, and P. M. Loiseau, "Strategies for prevention and treatment of Trichomonas vaginalis infections," Clinical

Microbiology Reviews, vol. 30, no. 3, pp. 811–825, 2017. View at: Publisher Site | Google Scholar

11. R. C. Bailey, S. Moses, C. B. Parker et al., "Male circumcision for HIV prevention in young men in Kisumu, Kenya: a randomised controlled trial," The Lancet, vol. 369, no. 9562, pp. 643–656, 2007. View at: Publisher Site | Google Scholar
12. B. Auvert, D. Taljaard, E. Lagarde, J. Sobngwi-Tambekou, R. Sitta, and A. Puren, "Randomized, controlled intervention trial of male circumcision for reduction of HIV infection risk: the ANRS 1265 trial," PLoS Medicine, vol. 2, no. 11, Article ID e298, 2005. View at: Publisher Site | Google Scholar
13. L. H. Bachmann, M. M. Hobbs, A. C. Seña et al., "Trichomonas vaginalis genital infections: Progress and challenges," Clinical Infectious Diseases, vol. 53, no. 3, pp. S160–S172, 2011. View at: Publisher Site | Google Scholar
14. WHO, Guidelines for the Management of Sexually Trasmitted Infections, World Health Organization, Geneva, Switzerland, 2004.
15. M. S. Barry, A. Ba Diallo, M. Diadhiou et al., "Accuracy of syndromic management in targeting vaginal and cervical infections among symptomatic women of reproductive age attending primary care clinics in Dakar, Senegal," Tropical Medicine & International Health, vol. 23, no. 5, pp. 541–548, 2018. View at: Publisher Site | Google Scholar
16. A. Kaida, J. J. Dietrich, F. Laher et al., "A high burden of asymptomatic genital tract infections undermines the syndromic management approach among adolescents and young adults in South Africa: Implications for HIV prevention efforts," BMC Infectious Diseases, vol. 18, no. 1, p. 499, 2018. View at: Google Scholar
17. B. Vuylsteke, "Current status of syndromic management of sexually transmitted infections in developing countries," Sexually Transmitted Infections, vol. 80, no. 5, pp. 333-334, 2004. View at: Publisher Site | Google Scholar
18. Z. M. Chirenje, N. Dhibi, H. H. Handsfield et al., "The etiology of vaginal discharge syndrome in Zimbabwe: results from the Zimbabwe STI etiology study," Sexually Transmitted Diseases, vol. 45, no. 6, pp. 422–428, 2018. View at: Publisher Site | Google Scholar
19. P. Kissinger, "Epidemiology and Treatment of Trichomoniasis," Current Infectious Disease Reports, vol. 17, no. 6, p. 484, 2015. View at: Publisher Site | Google Scholar
20. C. B. Menezes, A. P. Amanda Piccoli Frasson, and T. Tasca, "Trichomoniasis – are we giving the deserved attention to the most common non-viral sexually transmitted disease worldwide?" Microbial Cell, vol. 3, no. 9, pp. 404–418, 2016. View at: Publisher Site | Google Scholar
21. Roger C. T., Khadime S., Rougyatou K., Lamine D., Doudou S., Souleye L., Khardiata D., Babacar F., Thérèse D., Cheikh T. N., and Ahmet Y. Sow. A Study of Trichomonas vaginalis Infection and Correlates in Women with Vaginal Discharge Referred at Fann Teaching Hospital in Senegal. Journal of parasitology research. Volume 2019 |Article ID 2069672 | https://doi.org/10.1155/2019/2069672
22. M. Sutton, M. Sternberg, E. H. Koumans, G. McQuillan, S. Berman, and L. Markowitz, "The prevalence of Trichomonas vaginalis infection among reproductive-age women in the United States, 2001-2004," Clinical Infectious Diseases, vol. 45, no. 10, pp. 1319–1326, 2007. View at: Publisher Site | Google Scholar
23. P. Madhivanan, M. T. Bartman, L. Pasutti et al., "Prevalence of Trichomonas vaginalis infection among young reproductive age women in India: Implications for treatment and prevention," Sexual Health, vol. 6, no. 4, pp. 339–344, 2009. View at: Publisher Site | Google Schol
24. Wolner-Hanssen P, Krieger JN, Stevens CE, Kiviat NB, Koutsky L, Critchlow C, DeRouen T, Hillier S and Holmes KK. Clinical Manifestations of Vaginal Trichomoniasis. JAMA. 26:571-6, 1989.
25. Draper D, Jones W, Heine RP, Beutz M, French JI and McGregor JA. Trichomonas

vaginalis Weakens Human Amniochorion in an In Vitro Model of Premature Membrane Rupture. Infect Dis Obstet Gynecol. 2:267-74, 1995.

26. Sharma P, Malla N, Gupta I, Ganguly NK and Mahajan RC. A Comparison of Wet mount, Culture and Enzyme Linked Immunosorbent Assay for the Diagnosis of Trichomoniasis in Women. Trop Geogr Med. 43:257-60, 1991.
27. Stary A, Kuchinka-Koch A and Teodorowicz L. Detection of Trichomonas vaginalis on Modified Columbia Agar in the Routine Laboratory. J Clin Microbiol 40:3277-80, 2002.

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Intraocular foreign bodies: A major public health problem

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Abstract

Introduction: Intraocular foreign bodies are a major public health problem due to their frequency, their severity and their difficult and costly management. They mainly affect young men in the midst of professional activity and have serious social and medico-legal consequences.
Case presentation: We report the case of a 34-year-old patient, who suffered a contusive eye trauma with palpebral tearing of the left eye by barbed wire. The initial ophthalmologic examination found a preserved visual acuity, a transfixing eyelid injury with skin substance loss, a temporal conjunctival injury with hemorrhage and resulting from orbital fat. An orbital x-ray showed the radiopaque foreign bodies with no orbital fracture. The oculo-orbital CT scan xas normal. The V3M fundus revealed, on the postoperative day, a small pre-retinal brownish formation, measuring 0.2 mm, located ½ papillary diameter from the center of the fovea, without retinal alteration in front of, and without peripheral retinal lesions. Optical coherence tomography (OCT) showed a small hyperdense infra-millimeter formation, a retinal invasion limited to the fiber optic layer with posterior shadow cone. The patient was put on corticosteroid and antibiotic therapy. Regarding the foreign body, the decision to abstain from treatment has been taken.
Discussion: The decision to remove a missed retained intraocular foreign body is complex and depends on multiple factors, including surgical difficulty and the composition, size, and location of the retained foreign body. Removal should be weighed against the possible serious complications of intraocular surgery. If removal is surgically difficult, or the retained material is inert, patients can be managed conservatively with regular monitoring, as in our case.
Conclusion: Any traumatic element should be investigated to search an intraocular foreign body, by a careful examination, even if imaging is normal. The indications to operate in emergency are well codified.

Keywords: Intraocular foreign bodies, public health problem, brownish formation, retinal invasion, abstain

Introduction

The intraocular foreign bodies (IOFBs) are a major public health problem ; due to their frequency, their severity and their difficult and costly management. They mainly affect the young man in full period of professional activity, and they entail serious social and medico-legal consequences. If the IOFB is toxic, it should be removed as soon as possible. However, if the IOFB is inert, it may be managed conservatively with regular monitoring [1].

Case Presentation

A 34-year-old man, with no known medical illness, experienced a workplace accident. Upon arrival at the hospital, there was a left eyelid injury with no other injury. Ophthalmological examination showed a good

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visuel acuity in each aye (10/10), with transfixing eyelid injury, skin substance loss, temporal conjunctival injury, sub- conjunctival hemorrhage, and orbital fat issue. Fundus examination was difficult. An orbital radiography showed no IOFB, with no orbital fracture (Figure 1). An orbital scan was normal (Figure 2).

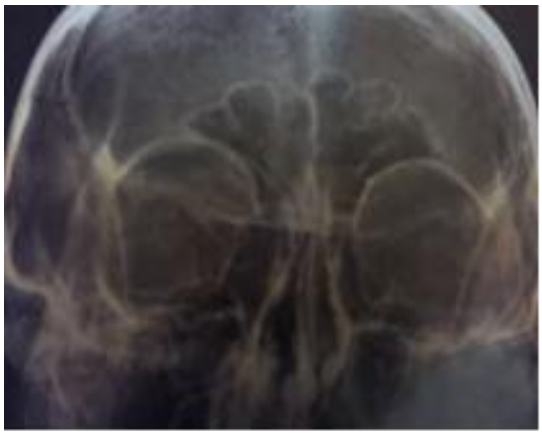

Figure 1. Orbital radiography : normal

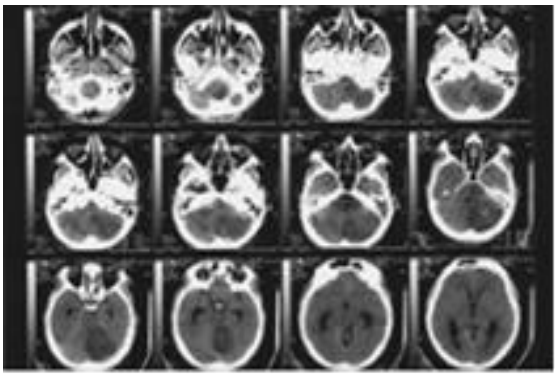

Figure 2. Orbital scan : normal.

On 1 day postoperative (surgical conjunctival exploration), a fundus examination showed a small preretinal brownish lesion, measuring 0.2 mm, located at ½ papillary diameter from the center of the fovea, without in front of and peripheral retinal alteration (Figure 3).

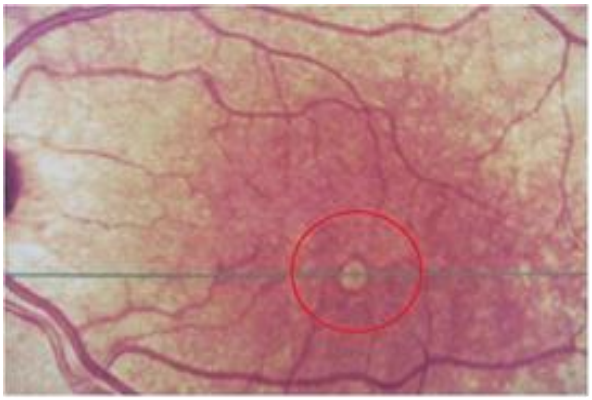

Figure 3. Fundus exam: small preretinal brownish lesion.

Optical coherence tomography (OCT) revealed an infra-millimeter hyperreflective lesion, retinal intrusion limited to the fiber optic layer, and posterior shadow cone (Figure 4). Electro-retinogram (ERG) was normal in both eyes.

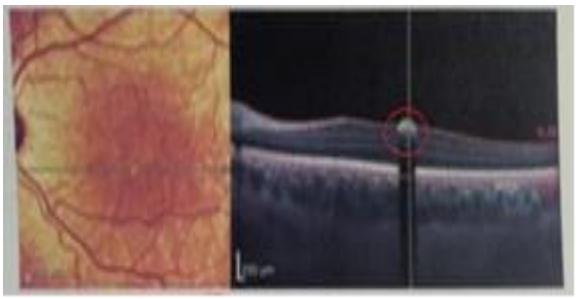

Figure 4. Optical coherence tomography : Infra-millimeter hyperreflective lesion.

The patient was treated conservatively as there was no active inflammation, and the rest of the retina was normal. On subsequent visits, his vision remained good, and there was no sign of inflammation.

Discussion

Intraocular foreign bodies (IOFBs) can be broadly classified as composed of organic and inorganic materials, with the latter including metals, glass, and plastics. They are also classified as inert or toxic [2]. Following direct mechanical damage, caused by the passage of the foreign body through the ocular tissue, any subsequent complications are influenced by the

composition of the IOFB [3]. Compared with inert IOFBs such as glass, higher rates of endophthalmitis havec been observed in patients with organic IOFBs, and higher rates of metallosis in patients with metallic IOFBs [4]. Other complications include secondary glaucoma, retinal detachment, proliferative vitreoretinopathy, and sympathetic ophthalmia [5]. The present patient was treated conservatively, because of many reasons :

- Patient vision remained good : 10/10 R2.
- There was no sign of inflammation : Inert.
- IOFB size : infra-mellimeter.
- IOFB location : juxta-foveolar.
- The rest of the retina was normal.

Conclusion

The decision to remove a missed retained IOFB is complex and depends on multiple factors, including surgical difficulty and the composition, size, and location of the retained foreign body. Removal should be weighed against the possible serious complications of intraocular surgery. If removal is surgically difficult, or the retained material is inert, patients can be managed conservatively with regular monitoring.

Patient consent

Patient consent was obtained previously.

Conflict of interest

" No conflict of interest ".

Funding

" No external funding "

References

1. Omoti AE, Dawodo OA, Ogbeide OU. An unusual case of marble intraocular foreign body. Middle East Afr J Ophthalmol. 2008, 15 : 39-42.
2. Ng T, Goh P. A patient with an Inert Intraocular Foreign Body. Cureus 2019, 11 (9) : e5737.
3. Dhoble PY, Velis GB, Sivakaumar P. Encapsulated metallic intraocular foreign body of long duration presenting with cystoid macular edema and normal full-field electroretinogram. Oman J Ophthalmol. 2019, 12 : 50-52.
4. Loporchio D, Mukkamala L, Gorukanti K, Zarbin M, Langer P, Bhagat N. Intraocular foreign bodies : a review. Surv Ophthalmol. 2016, 61 : 582-596.
5. Caciula D, Gavris M, Tamasoi I. Penetrating corneal wound with traumatic cataract and intraocular foreign body-case report. Rom J Ophthalmol. 2017, 61 : 54-59.

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Study of surfactant and their use in drug delivery

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Abstract

The previous ten years has been observer to another stimulus in surfactant self-get together articles as specialists for drug conveyance that are an option to micellar, lamellar (liposome, niosome and transfersome) or microemulsion-based vehicles. The audit focuses on the utilization of polymeric micelles as drug transporters. Micellization of naturally dynamic substances is an overall peculiarity that expands the bioavailability of lipophilic medications and supplements. At present utilized low-sub-atomic weight drug surfactants have low harmfulness and high solubilisation power towards inadequately solvent drugs.

Keywords: surfactant, drug, polymeric micelles, lipophilic medications

Introduction

Different medication conveyance and medication focusing on frameworks are right now evolved or being worked on. Among drug transporters one can name dissolvable polymers, microparticles made of insoluble or biodegradable regular and engineered polymers, microcapsules, cells, cell apparitions, lipoproteins, lipo-somes, and micelles(1). Micelles as medication transporters can give a bunch of unsurpassable benefits - they can solubilize ineffectively dissolvable medications and in this way increment their bioavail-capacity, they can remain in the body (in the blood) long enough giving continuous amassing in the re-body areas with cracked vasculature. Surfactant phase structures have piqued the interest of pharmaceutical scientists over the years, either as drug vehicles/carriers or, more recently, as targetting systems. In the first case, the surfactant system plays no role in the biodistribution of the medication it transports, instead functioning just as a carrier. The surfactant system in the second case 'conveys' the drug to the desired (or target) site in the body and deposits it in some way. Targeting can take one of two forms; namely ‘passive’ targeting which relies on the natural biodistribution of the carrier, or ‘active’ targeting in which the carrier is in some way directed to the desired site, frequently by the use of targeting ligands expressed on the surface of the carrier. The micelle is designed in such a manner that the micelle's exposed outer surface in the aqueous environment is made up of components that aren't reactive with blood or tissue components.(2) Micelles can linger in the blood (tissues) for a long time without being identified by proteins and/or phagocytic cells due to this structural characteristic. This longevity is an extremely important feature of micelles as drug carriers.

Surfactant uses and development

Surfactants are commonly utilised in pharmaceutical formulations as wetting agents to aid in the dissolving and absorption of poorly soluble medicines. For this, reasonable and low molecular weight ionic surfactants, such as sodium lauryl sulphate, are utilised

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in concentrations that are safe for the intestinal mucosa. Previous research has found that ionic surfactants are considerably more damaging to biological membranes than non-ionic surfactants (3). Furthermore, lipophilic non-ionic surfactants dissolve poorly soluble moieties better than ionic surfactants. Non-ionic surfactants are thus more efficient in the dissolving of poorly soluble medicines than ionic surfactants. Non-ionic surfactants are highly effective emulsifiers for use in self-emulsifying medication delivery systems. Surfactants can be found in both natural and synthetic forms. Natural amphiphiles such as lipids and glycerol-based surfactants, are the major standard surfactants. Solans & Kunieda (4) state that they are an important component of the cell membrane. When animal and vegetable oils were mixed with alkaline salts, a soap-like substance was created, which might be useful in the treatment of skin diseases and for washing(5). Synthetic surfactants are being used in a variety of production processes and compositions (6).

A Pulmonary surfactant

A Pulmonary surfactant substance that covers the whole mammalian lung surface is referred to as pulmonary surfactant. It is synthesised by type II pneumocytes and secreted into the thin aqueous layer bordering the alveolar surface in the form of multilamellar structures, as previously stated (7). Its major goal is to keep the surface tension at the air–liquid interface below 2 mN/m, avoid pulmonary collapse during expiration, and limit the amount of labour required for inhalation. To keep breathing going, pulmonary surfactant is required. Surfactant deficiency or malfunction inhibits the alveoli from functioning properly, resulting in serious lung illnesses (8), such as Infant Respiratory Distress Syndrome (IRDS) or Acute Respiratory Distress Syndrome (ARDS), all of which are linked to lung damage. The phrase "polymeric carrier" refers to a polymer-based delivery system that may entrap and carry molecules of interest. They can be made of synthetic materials like polyesters or natural materials like alginate or chitosan (9,10). Synthetic polymers are favoured in principle because those originating from animal or vegetal sources may provide a risk of infection and immunogenicity.

Surfactant source

Bronchoalveolar lavage has been used in the majority of surfactant composition research (11). The same lipid and protein components are found in human and other mammalian species (12,13), albeit the amounts of different lipid classes vary somewhat, perhaps due to methodological differences. Many of the major lipids present in mammals can also be detected in the lungs of air-breathing shes (14), suggesting that 'pulmonary' surfactant has a long past.

Niosomes

Niosomes are an unique drug delivery technology that encapsulates the medication in a vesicle. Niosomes are vesicles that are made up of a bilayer of non-ionic surface active substances. The niosomes are very tiny and microscopic. In the same way as liposomes are formed up of a bilayer, niosomes are also. In the case of niosomes, however, the bilayer is made up of non-ionic surface active molecules rather than phospholipids, as in the case of liposomes. Most surface active chemicals produce micellar structures when submerged in water, however certain surfactants can produce bilayer vesicles, which are niosomes.

Depending on the method used to prepare them, niosomes can be unilamellar or multilamellar. The niosome is composed of a surfactant membrane with hydrophilic ends facing each other on the outside and interior of the vesicle, and hydrophobic chains facing each other within the membrane.(15) The majority of anticancer medications have serious adverse effects. Niosomes have the ability to change metabolism, extend medication circulation and half-life, and thereby reduce pharmacological adverse effects.(16)Niosomes cause a slower rate of tumour development and greater plasma levels, as well as longer clearance.

Advantages of Niosomes (17-20)

- Use of niosomes in cosmetics was first done by L'Oreal as they offered the following advantages
- The vesicle suspension being water based offers greater patient compliance over oil based systems.

- Since the structure of the niosome offers place to accommodate hydrophilic, lipophilic as well as amphiphilic drug moieties, they can be used for a variety of drugs.
- The characteristics such as size, lamellarity etc. of the vesicle can be varied depending on the requirement.
- The vesicles can act as a depot to release the drug slowly and offer a controlled release.

Application of Niosomes (21-24)

- It's used to target drugs.
- It is used to treat anti-neoplastic diseases such as cancer.
- Sodium stibogluconate is used to treat Leishmaniasis, which includes both dermal and mucocutaneous infections.
- It serves as a vehicle for the delivery of peptide drugs.
- It's utilised to research immune responses.
- Niosomes as Hemoglobin Transporters
- Niosome-based transdermal drug delivery systems
- It's employed in the delivery of ophthalmic drugs.

Surfactant-Templated Mesoporous Silica Nanoparticles

As anticancer drug delivery methods, three kinds of surfactant-templated mesoporous silica nanoparticles (Surf@MSNs) with diameters of 150–660 nm were produced. High drug (surfactant) loading capacities, prolonged drug (surfactant) release patterns, and high and long-term anticancer effectiveness are all features of the Surf@MSNs.(25)

It is well known that mesoporous silica nanoparticles (MSNs) possess some excellent properties such as facile multifunctionalization, excellent biocompatibility and biodegradability, high specific surface area and pore volume, tunable pore structures and excellent physicochemical stability (26-29). Because of its rising uses in nanomedicine and biotechnology, mesoporous silica nanoparticles (MSNs) have got a lot of attention (30-33). Materials like MSN which are having high surface area and good pore volume have been studied as one of the important application in area of drug delivery devices.

MSNs materials were synthesised by using following procedure which was previously published with some modifications in literature.(34-35) .

Briefly, the structure directing agent, PMES, (0.213 g, 0.5 mmol) was dissolved in 100 mL of nanopure water which was stirred vigorously at 80 0C for one hour. After that, APTMS was added slowly dropwise into above solution which was later followed by the addition of TEOS (1 mL, 4.5 mmol) at the rate of 20 mL/h. Structural properties of MSNs were modified by using different molar ratios of APTMS and PMES.

Conclusion

Lipid and surfactant based drug delivery systems are promising approach for improving bio-availability of poorly soluble drug compound. Niosomes have been proven to be useful in the delivery of anti-infective agents, anti-cancer agents, anti-inflammatory agents and fairly recently as vaccine adjuvants.

In choosing a suitable drug to be delivered by niosomes, it should be borne in mind that niosomes encapsulating hydrophobic drugs and macromolecules are more stable than niosomes encapsulating low molecular weight drugs.

References

1. Vladimir P. Torchilin, Structure and design of polymeric surfactant-based drug delivery systems, Journal of Controlled Release 73 (2001) 137 –172.
2. M. Jayne Lawrence, Chemical Sociecty Review,(1994) 417-424.
3. Davis W, Pfeiffer R, Quay J. (1970). Normal and promoted gastrointestinal absorption of water-soluble substances I: induced rapidly reversible hyperabsorptive state in the canine fundic stomach pouch. J Pharm Sci 59:960–3.
4. Solans C, Kunieda, H. (1996). Industrial applications of micro emulsions. New York, USA: Marcel Dekker.

5. Garg T, Singh S, Goyal AK. (2013). Stimuli-sensitive hydrogels: an excellent carrier for drug and cell delivery. Crit Rev Ther Drug Carrier Syst 30:369–409.

6. Dickinson, E. (1992). Introduction to food colloids. Oxford, UK: Oxford University Press.

7. J. Perez-Gil, T.E. Weaver, Pulmonary surfactant pathophysiology: current models and open questions, Physiology 25 (3) (2010) 132–141.

8. M. Griese, Pulmonary surfactant in health and human lung diseases: state of the art, Eur. Respir. J. 13 (6) (1999) 1455–1476.

9. C. Loira-Pastoriza, J. Todoroff, R. Vanbever, Delivery strategies for sustained drug release in the lungs, Adv. Drug Deliv. Rev. 75c (2014) 81–91.

10. J.C. Sung, B.L. Pulliam, D.A. Edwards, Nanoparticles for drug delivery to the lungs, Trends Biotechnol. 25 (12) (2007) 563–570.

11. L.A. Creuwels, L.M. van Golde, H.P. Haagsman, Lung 175 (1997) 1^39.

12. C.M. Rebello, A.H. Jobe, J.W. Eisele, M. Ikegami, Am. J. Respir. Crit. Care Med. 154 (1996) 625-628.

13. M. Ikegami, C.M. Rebello, A.H. Jobe, J. Appl. Physiol. 81 (1996) 2517-2522.

14. A.W. Smits, S. Orgeig, C.B. Daniels, Am. J. Physiol. 266, (1994) R1309-R1313.

15. Gadhiya P, Shukla S, Modi D, Bharadia P, A Review- Niosomes in Targeted Drug Delivery, International Journal for Pharmaceutical Research Scholars, 2, 2012, pp. 60.

16. Kshitij B. Makeshwar*, Suraj R. Wasankar, Asian J. Pharm. Res. 2013; Vol. 3: Issue 1, Pg 16-20.

17. Biju SS., Talegaonkar S., Misra PR., Khar RK., Vesicular systems: An overview. Indian J. Pharm. Sci. 2006, 68: 1418153.

18. Ijeoma F., Uchegbu., Suresh P., Vyas., Nonionic surfactant based vesicles (niosomes) in drug delivery. Int. J. Pharm. 1998; 172: 33–70.

19. Malhotra M., Jain N.K., Niosomes as Drug Carriers. Indian Drugs. 1994, 31(3): 818866.

20. Alsarra A., Bosela A,, Ahmed S.M,, Mahrous G.M., Proniosomes as a drug carrier for transdermal delivery of ketorolac. Eur. J. Pharm. And Biopharm. 2004; 2(1): 186.

21. Chandraprakash KS, Udupa N., Umadevi P., Pillai GK., Formulation and Evaluation of Methotrexate Niosomes. Ind J Pharm.Sci. 199254(5): 197.

22. Agarwal S., Vasudha Bakshi., Villa P., Raghuram AP., Pandey S., Udupa N., Effect of cholesterol content and surfactant HLB on vesicle properties of niosomes. IJPS, 2004, 66(1): 1218123.

23. Madhav. NVS and saini. A, niosomes: a novel drug delivery system.Int. J.rpc. 2011, 1(3): 4988511.

24. Mark chasin, Biodegradable polymers as drug delivery systems. 2008, 2618338.

25. Qianjun He, Jianlin Shi, Feng Chen, Min Zhu, Lingxia Zhang, Biomaterials 31 (2010) 3335–3346.

26. Vallet-Regı´ M, Ra´mila A, del Real RP, Pe´ rez-Pariente J. A new property of MCM- 41: drug delivery system. Chem Mater 2001;13:308–11.

27. Vallet-Regı´ M, Balas F, Arcos D. Mesoporous materials for drug delivery. Angew Chem Int Ed 2007;46:7548–58.

28. Li Y, Shi J, Hua Z, Chen H, Ruan M, Yan D. Hollow spheres of mesoporous

aluminosilicate with a three-dimensional pore network and extraordinarily high hydrothermal stability. Nano Lett 2003;5:609–12.

29. Slowing II, Trewyn BG, Lin VSY. Mesoporous silica nanoparticles for intracellular delivery of membrane-impermeable proteins. J Am Chem Soc 2007;129:8845–9.

30. Vallet-Regi M. Nanostructured mesoporous silica matrices in nanomedicine. J Int Med 2009;267:22e43.

31. Liong M, Angelos S, Choi E, Patel K, Stoddart JF, Zink JI. Mesostructured multifunctional nanoparticles for imaging and drug delivery. J Mater Chem 2009;19:6251e7.

32. Vivero-Escoto JL, Trewyn BG, Lin VSY. Mesoporous silica nanoparticles: synthesis and applications. Annu Rev Nano Res 2010;3:191e231.

33. Hom C, Lu J, Tamanoi F. Silica nanoparticles as a delivery system for nucleic acid-based reagents. J Mater Chem 2009;19:6308e16.

34. Che S, Garcia-Bennett AE, Yokoi T, Sakamoto K, Kunieda H, Terasaki O, et al. A novel anionic surfactant templating route for synthesizing mesoporous silica with unique structure. Nat Mater 2003;2:801e5.

35. Chih-Hsiang Tsai, Juan L. Vivero-Escoto*, Igor I. Slowing, I-Ju Fang, Brian G. Trewyn, Victor S.-Y. Lin, Surfactant-assisted controlled release of hydrophobic drugs using anionic surfactant templated mesoporous silica nanoparticles, Biomaterials 32, (2011), 6234-6244