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Review Article

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OCULAR IMPLANTS WITH DIFFERENT TYPES OF DESIGNS AND MATERIALS

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ABSTRACT:

Present research the ocular implants i.e., corneal inlays, corneal plugs, corneal onlays ,contact lenses,keratoprosthesis,keratoplasty, ophthalmic devices using for the ocular implants now days utilizing for the corneal transplantation. Types of the materials used for the types of implants used in ophthalmic for the improve the vision and support for the human body. Corneal onlays for use in surgical implantation into or onto the cornea of a mammal are described. Keratoprosthesis also known as artificial cornea mainly used for the replacement of donor cornea to the new making cornea with the help of polymers or hydrogels. Corneal plugs mainly treatment for the dry eye disease. Keratoplasty is a type of surgery replacement of patient cornea with the help of donor cornea .as a described below as types of design with the help of different polymers.

KEY WORDS:- Hydrogels, keratoprosthesis , keratoplasty , corneal blindness.

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INTRODUCTION:-

CORNEAL INLAYS AND ONLAYS

In the present research the corneal inlays and onlays mainly used for provide the strength to the long sightedness elasticity of the lens of the eye, mainly occur middle old age. Corneal inlays and onlays are filled on corneal surface to provide the strength to the eye .different materials used in different design (TABLE 1)plastic materials ,collagen, donor cornea, polysulfone plastic ,platinum gold ,silicone ,polycarbonate,poly ethylene glycol and Perfluoropolyether, are used in corneal onlays and inlays .

TABLE 1: Corneal Inlays and onlays

S.NO	MATERIALS	TYPE OF DESIGN
1	Inert plastic material	Corneal inlays: Artificial cornea to replace stroma
2	Collagen	Method of manufacture and implantation of corneal inlays
3	Donor cornea	Intracorneal Inlay
4	polysulfone plastic	Hydrogel Corneal Inlay
5	Flap material	Intracorneal Inlays
6	Polysulfone	Intracorneal astigmatic Onlay
7	Platinum, gold, silicone in peripheral region.	Corneal Implant: corneal onlays
8	Polycarbonate, Poly ethylene glycol(PEG)	Corneal Onlays
9	Perfluoropolyether, collagen-hydrogel co polymeric materials.	Corneal Onlay
10	Iso-refractive polymers	Corneal Onlays:-photo refractive keratectomy, laser assisted in situ keratomileusius
11	Silicone rubber; HEMA	Corneal implant and method of making the same: corneal plug

CONTACT LENSES, , CORNEAL PLUGS, INTRAOCULAR LENSES AND CORNEAL IMPLANTS

While the present research mainly focusing on the contact lenses (mainly used in the to correct the refractive errors mainly contact lenses made with the materials Vinyl Trifluoroacetate (VTA) and poly vinyl alcohol polyisocyanate, polysiloxane and Poly (HEMA) (Table 2) .

Corneal plugs are mainly placed in tear duct to prevent the dry eye symptoms, mainly this type of plugs made with the help of poly methyl methacrylate,phema (Table 2).

Intraocular lenses mainly used in the cataract surgery, intraocular lenses are medical devices which placed in inside of the eye.it will also used in refractive lens exchange intraocular lenses made with the Poly(vinyl trifluoroacetate), poly(vinyl alcohol), poly(acrylic acid) (Table 2).

Corneal implants or corneal transplants are a surgical procedure to replace a damaged cornea with donated cornea or new making cornea with the help of polymers Photopolymers;- poly methyl methacrylate (PMMA), ethylene glycol phenyl ether acrylate (PEA), Azobisisobutyronitrile (AIBN), Polymethyl methacrylate (PMMA), polycarbonates, HEMA, polysulfone, silicones (Table 2).

Table 2 Materials and different designs of contact lenses, corneal plugs. Intraocular lenses and corneal implants.

S.NO	MATERIALS	DESIGN
1	Vinyl Trifluoroacetate (VTA) and poly vinyl alcohol	contact lenses, corneal implants and transplants, and Intraocular lenses.
2	Poly(vinyl trifluoroacetate), poly(vinyl alcohol), poly(acrylic acid)	contact lenses, corneal implants and transplants, and intraocular lenses.
3	Poly (HEMA)	Amphiphic segmented co-polymer of controlled morphology and ophthalmic devices including contact lenses made there from
4	polyisocyanate, polysiloxane	Artificial Cornea And Contact Lenses:- Polymer For Coating Surfaces
5	Homopolymers;- poly methyl methacrylate (PMMA), ethylene glycol phenyl ether acrylate (PEA), Azobisisobutyronitrile (AIBN),	Intraocular Lenses, Corneal Implants, Corneal Overlays, And Phakic Retractive Lenses.
6	Polymethyl methacrylate (PMMA),	Corneal Implant

	polycarbonates, HEMA, polysulfone, silicones	
7	polymethyl methacrylate (PMMA), polycarbonates, HEMA, polysulfone, silicones	Corneal Implant

Corneal prosthesis, Artificial Cornea, Intrastromal Corneal Modification

Artificial cornea or corneal prosthesis/keratoprosthesis is type of implant which is used mainly in replacement of donor cornea with the help of new polymers making artificial cornea is also called keratoprosthesis ,artificial cornea made with different types of polymers and hydrogels i.e. Methacrylate, silicone, polymethyl methacrylate, hydroxyethyl methacrylate, lower alkyl butyrates, silicone-acrylate copolymer, fluorocarbon such as Teflon, polypropylene, polyethylene terephthalate (**Table 3**). Keratoplasty is a replacement process in which collect the human cadaver cornea and replace to the patient cornea.

Intrastromal corneal modification is implanted in the deep corneal stroma to modify the corneal curvature (**Table 3**).

Table 3 Corneal prosthesis, Artificial Cornea, Intrastromal Corneal Modification.

S.NO	MATERIALS	DESIGN
1	Methacrylate, silicone, polymethyl methacrylate, hydroxyethyl methacrylate, lower alkyl butyrates, silicone-acrylate copolymer, fluorocarbon such as Teflon, polypropylene, polyethylene terephthalate	Artificial cornea
2	Polymethyl methacrylate (PMMA)	Intraocular Prostheses
3	Hydrophilic urethane, Hydrophilic silicone, Afluoropolymer, Cellulose acetate butyrate	Intraocular Prostheses
4	Polytetrafluoroethylene aluminium oxide	Corneal Prosthesis
5	2-hydroxyethyl methacrylate, 2-hydroxyethyl methacrylate-N-vinyl-2 Pyrrolidinone.	Intrastromal Corneal Modification
6	Collagen ,silicone,polyz methyl methacrylate, cellulose acetate butyrate, acrylic polymers	Intrastromal Corneal Modification
7	Collagen, silica, PMMA (polymethyl methacrylate),copolymer of methyl methacrylate	Intrastromal corneal

	with siloxanylalkyl methacrylate , cellulose acetate butyrate, acrylic polymers.	modification via laser
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OTHER TYPES OF CORNEAL IMPLANTS

Polymer Blends With High Water Absorption:-

polymer blends mainly used in dry eye symptoms this polymer blends are made up of Hydrophilic polymers: N-vinylpyrrolidone, N,N-dimethylacrylamide, polyvinyl Methyl ether, N-vinylacetamide, poly-ethyl oxazolinone and the like. Poly-ethyl oxazoline may be prepared by the polymerization of ethyl oxazoline or by the acylation of poly ethyleneimine. hydrophobic polymers: polybenzylmethacrylate, polyphenylene ether sulfone, copolymers of polyvinyl chloride and vinyl acetate; aromatic polyesters such as PE-100 polyphenylmethacrylate, polyvinylcinnamate and polyvinyl butyral.

Biostable Corneal Implants:-

biostablecorneal implants are resistant to microorganisms i.e. ethylene glycol diacrylate, ethylene glycol dimethacrylate, 1,4-butylene dimethacrylate, 1,3-butylene; dimethacrylate, 1,4-butylene dimethacrylate, propylene glycol diacrylate, propylene glycol dimethacrylate, diethylene glycol dimethacrylate.

Corneal Pressure-Regulating Implant Device:

This type of device made up of titanium and ceramics. It will control the intra ocular pressure in the cornea.

Intracorneal Lens: - Intracorneal lens implanted in the inside of the cornea corneal stroma to correct the refractive acuity. This type of intra ocular lens made by Suitable monomers:- arylmethacrylates, aryl alkyl (meth)acrylates, naphthyl (meth)acrylates, styrene, methyl styrene, N-vinylcarbazole, N,N dimethyl acrylamides, 2-phenylethyl methacrylate, 3-phenylpropyl methacrylate, 4-phenylbutylmethacrylate, 2-phenoxyethyl methacrylate, 3-phenoxypropyl methacrylate, 4-phenoxybutyl methacrylate,

Conclusion:

In this review concluded that types of design with the help of different materials used for the ophthalmic and corneal implants are described.

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