3 DRUG PROFILE AND EXCIPIENTS DETAILS

The physicochemical and pharmacokinetic parameters of Pantoprazole Sodium Sesquihydrate were enlisted below.

<table>
<thead>
<tr>
<th>Name of Drug</th>
<th>Pantoprazole Sodium Sesquihydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td><img src="image" alt="Chemical Structure" /></td>
</tr>
<tr>
<td>Chemical name</td>
<td>5-(Difluoromethoxy)-2-[(3,4-dimethoxy-2-pyridyl)methyl] sulfinyl]benzimidazole, sodium salt, sesquihydrate</td>
</tr>
<tr>
<td>Empirical formula</td>
<td>C_{16}H_{14}F_{2}N_{3}NaO_{4}S·1.5H_{2}O</td>
</tr>
<tr>
<td>Empirical weight</td>
<td>432.37</td>
</tr>
<tr>
<td>Description</td>
<td>White to brownish white odorless crystalline powder</td>
</tr>
<tr>
<td>Solubility water</td>
<td>Soluble in water</td>
</tr>
<tr>
<td>Other solvents</td>
<td>Freely soluble in ethanol</td>
</tr>
<tr>
<td></td>
<td>Slightly Soluble in hexane</td>
</tr>
<tr>
<td>Melting point</td>
<td>137-140°C</td>
</tr>
<tr>
<td>Particle size</td>
<td>d_{90} = NMT 15µm, d_{50} = NMT 10µm, d_{10} = NMT 5µm</td>
</tr>
<tr>
<td>Polymorphism</td>
<td>Does not exhibit polymorphism</td>
</tr>
<tr>
<td>Isomerization</td>
<td>Does not exhibit isomerism</td>
</tr>
<tr>
<td>Category</td>
<td>Proton pump inhibitor</td>
</tr>
<tr>
<td>Absorption and Biotransformation</td>
<td>Absorption behavior - rapidly absorbed</td>
</tr>
<tr>
<td></td>
<td>Absolute bioavailability - 77%</td>
</tr>
<tr>
<td></td>
<td>Food effect - Food has no effect on AUC and bioavailability.</td>
</tr>
<tr>
<td>Distribution</td>
<td>Protein binding - about 98%</td>
</tr>
<tr>
<td></td>
<td>Volume of distribution - 0.15 l/kg.</td>
</tr>
<tr>
<td>Elimination</td>
<td>Metabolized at - Liver</td>
</tr>
<tr>
<td></td>
<td>Metabolic pathway - Demethylation by CYP2C19</td>
</tr>
<tr>
<td></td>
<td>Terminal half-life - about 1 h</td>
</tr>
<tr>
<td></td>
<td>Clearance - about 0.1 l/h/kg</td>
</tr>
<tr>
<td><strong>Main metabolite</strong></td>
<td>Desmethylpantoprazole.</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td><strong>Posology</strong></td>
<td>Recommended oral dosage - 20 mg tablet per day, increasing to 40 mg pantoprazole per day if a relapse occurs.</td>
</tr>
<tr>
<td><strong>Administration instructions</strong></td>
<td>Tablets should not be chewed or crushed, and should be swallowed whole one hour before a meal with some water.</td>
</tr>
<tr>
<td><strong>Use/ indications</strong></td>
<td>For the treatment of mild reflux disease (Heartburn, Prevention of relapse in reflux oesophagitis, Prevention of gastroduodenal ulcers, Patients at risk with a need for continuous NSAID treatment).</td>
</tr>
<tr>
<td><strong>Mode of action</strong></td>
<td>Inhibits the secretion of hydrochloric acid in the stomach by specific action on the proton pumps of the parietal cells.</td>
</tr>
<tr>
<td><strong>Adverse reaction</strong></td>
<td>Vomiting, Constipation, Diarrhoea, Upper abdominal pain, Dry mouth.</td>
</tr>
<tr>
<td><strong>Precaution/ Warning</strong></td>
<td>Monitored regularly for patent suffered with severe liver impairment.</td>
</tr>
</tbody>
</table>

### 3.1 Excipients details

The critical material attributes (CMAs) of all excipients used in research was described below. The CMA of excipient gave idea for selection of excipient and its grade to get stable and quality PTZ MUPS tablet.

#### 3.1.1 Neutral sugar pellets
Category: Non Pariel Seeds
Components: Sucrose (up to 92%) and maize starch
CMAs: Particle size, surface area, composition, porosity, sphericity, friability, density.

3.1.2 **Neutral microcrystalline cellulose pellets**
Category: Non Pariel Seeds
Particle Size: 150-300 micron
Components: 100% microcrystalline cellulose
Grade/Brand name: Celphere® CP-203
CMAs: Particle size, surface area, composition, porosity, sphericity, friability, density

3.1.3 **Sodium Carbonate Anhydrous**
Category: Alkalizer/Stabilizer
CMAs: Sodium content, particle size

3.1.4 **Povidone**
Category: Binder
Grade/Brand name: Kollidon®30
CMAs: Viscosity, Degree of polymerization, peroxide content

3.1.5 **Polysorbate 80**
Category: Wetting agent
Grade/Brand name: Kolliphor® PS 80
CMAs: Peroxide content

3.1.6 **Talc**
Category: Anti-tacking agent
Grade: Standard
CMAs: Particle size

3.1.7 **Low-Substituted Hydroxypropyl Cellulose**
Category: Super-disintegrant
Grade/Brand name: L-HPC LH-31
Hydroxypropoxy content: 11%
Angle of repose: 49°
Average particle size: 25µm
Bulk density: 0.28 g/cm³
Tapped density: 0.59 g/cm³
CMAs: Hydroxypropoxy content, particle size

3.1.8 Microcrystalline Cellulose
Category: Cushioning agent, compressibility enhancer
Grade/Brand name: Ceolus® KG 1000
Bulk density: 0.12 g/cm³
Average diameter: 50 µm
Angle of repose: 57°
CMAs: Hydroxypropoxy content, particle size

3.1.9 Microcrystalline Cellulose
Category: Diluent
Grade/Brand name: Avicel PH 200
Specific surface area: 0.78–1.18 m²/g
Nominal mean particle size: 180µm
Moisture content: ≤ 5.0%
CMAs: Hydroxypropoxy content, particle size

3.1.10 Hydroxypropoxy methylcellulose (Hypromellose 2906)
Category: Binder
Grade/Brand name: Methocel® F-VLV
Type of chemistry: F chemistry
Methoxyl Degree of Substitution: 1.8
Methoxyl: 28%
Hydroxypropyl Molar Substitution: 0.13
Hydroxypropyl: 5.0%
CMAs: Viscosity

3.1.11 Hydroxypropoxy methylcellulose (Hypromellose 2910)
Category: Binder
Grade/Brand name: Methocel® E6 Premium LV
Type of chemistry: E chemistry
Methoxyl Degree of Substitution : 1.9
Methoxyl : 29%
Hydroxypropyl Molar Substitution : 0.23
Hydroxypropyl : 8.5%
CMAs: Viscosity

3.1.12 Methacrylic Acid Copolymer Dispersion
Category: Enteric coating polymer
Chemical name: Methacrylic Acid–Ethyl Acrylate Copolymer (1 : 1)
Dispersion 30 per cent
Solubility/permeability: Soluble in intestinal fluid from pH 5.5
Grade/Brand name: Eudragit® L30D-55
Apparent viscosity: $\leq 15$ mPa.s
Residue on evaporation: 28.5–31.5%
CMAs: pH, solid content

3.1.13 PlasACRYL® HTP20
Category: Plasticizer
Grade/Brand name: PlasACRYL® HTP20
Solid content : 20% w/w
Precaution: PlasACRYL® HTP20 is thixotropic in nature. Before use, shake the container well to get PlasACRYL® HTP20 in pourable form and well distributed.
CMAs: Polysorbate 80 content, Triethyl citrate content, Glyceryl monostearate content, shelf life

3.1.14 Polyethylene Glycol
Category: Plasticizer
Grade: PEG 6000
Density : 1.080 g/cm3
Freezing point : 55–61°C
Hydroxyl value : 16–22
Viscosity (dynamic): 200–270 mPa s
Viscosity (kinematic): 185–250 mm²/s
CMAs: Peroxide content

3.1.15 Neotame
Category: Sweetener
CMAs: Shelf life

3.1.16 Red Oxide of Iron
Category: Colouring agent
CMA: Iron content

3.1.17 Mannitol
Category: Diluent, Cushioning agent
Grade/Brand name: Pearlitol® 400 DC
Particle size: maximum of 20% greater than 500 mm and minimum of 85% greater than 100 mm in size
CMAs: Particle size

3.1.18 Mannitol
Category: Co-processed disintegrant
Grade/Brand name: Pearlitol® Flash
CMAs: Particle size

3.1.19 Crospovidone
Category: Super-disintegrant
Grade/Brand name: Kollidon CL-SF
CMAs: Particle size, peroxide content

3.1.20 Strawberry flavour
Category: Flavoring agent
Manufacturer: International Flavours and Fragrances, USA
CMAs: Shelf life
3.1.21 Colloidal Silicon Dioxide
Category: Glidant
Manufacturer: Evonik
Grade/Batch no: Aerosil® 200 Pharma
CMAs: Specific surface area

3.1.22 Magnesium stearate
Category: Lubricant
Manufacturer: Sunshine Organics
CMAs: Specific surface area, Particle size