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Review Article

PHARMACOKINETIC DATA AND SOLUBILITY PROFILE OF ANTIANGINAL AND ANTI-ISCHAEMIC DRUGS

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Abstract
Pharmacokinetic data And Solubility Profile Of drugs are the basic requirement of any researcher, for selecting an appropriate drug for any kind of formulation development. To get such data of all drugs of any category at one place is very difficult task; we by our review article have tried to give all such data of antianginal and anti-ischaemic drugs at one place.

Keywords: -

Introduction

Antianginal And Anti Ischaemic Drugs[1]

Beta-Blockers:-

1. Propranolol
2. Metoprolol
3. Atenolol

Calcium Channel Blockers:-

1. Verapamil
2. Diltiazem
3. Nifedipine
4. Felodipine
5. Amlodipine
6. Nitrendipine
7. Nimodipine
8. Lacidipine
9. Nicorandil
10. Dipyridamole
11. Trimetazidine
12. Oxyphendrine

Nitrates:-

1. Isosorbidedinitrate
2. Isosorbidemononitrate

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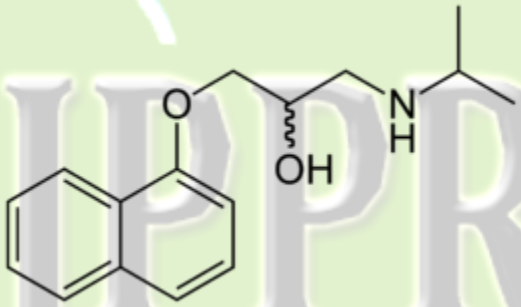
Propranolol[2]



Systematic (IUPAC) name (*RS*)-1-(isopropyl amino)-3-(1-naphthyloxy) propan-2-ol

Chemical data

Formula$C_{16}H_{21}NO_2$

Mol. mass 259.34 g/mol

Solubility profile: - White to off white, crystalline powder. Is odorless and has a bitter taste. Melt at about 164 degree. Soluble in water and in alcohol, Slightly soluble in chloroform.Prcticaly insoluble in ether.**[USP][3]**

Solubility profile: - Soluble in water and in ethanol(95 percent),Slightly soluble in chloroform, Practically insoluble in ether.**[IP][4]**

Pharmacokinetic data

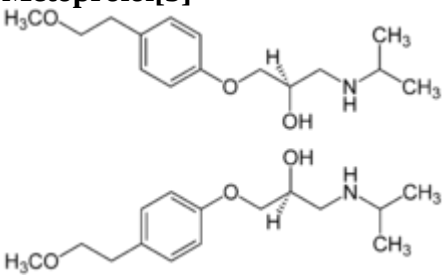
Bioavailability 26%

Metabolismhepatic (extensive)

Half-life 4-5 hours

Excretion renal <1%

Metoprolol[5]



Systematic (IUPAC) name(*RS*)-1-(isopropyl amino)-3-[4-(2-methoxyethyl)phenoxy]propan-2-ol

Chemical data

Formula $C_{15}H_{25}NO_3$

Mol. mass 267.364 g/mol

Solubility profile:-

Metoprolol Succinate:-White to off white powder, Freely soluble in water, Soluble in methanol, Sparingly soluble in alcohol, Slightly soluble in isopropyl alcohol. **[USP][6]**

Metoprolol Tartrate:-White crystalline powder, Very soluble in water, Freely soluble in methylene chloride, In chloroform and in alcohol, Slightly soluble in acetone, Insoluble in ether**[USP][6]**

Solubility profile:-Very soluble in water, Frely soluble in ethanol and in chloroform, in dichloromethane, slightly soluble in acetone, practically insoluble in ether. **[IP][7]**

Pharmacokinetic data

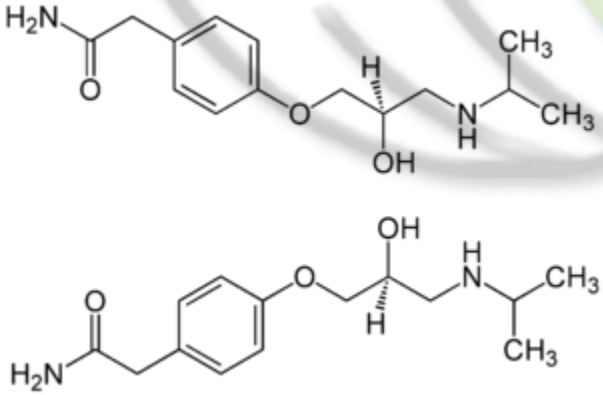
Bioavailability 12%

Metabolism Hepatic

Half-life 3-7 hours

Excretion Renal

Atenolol[8]



Systematic (IUPAC) name(*RS*)-2-{4-[2-hydroxy-3-(propan-2-ylamino) propoxy] phenyl} acetamide

Chemical data

Formula $C_{14}H_{22}N_2O_3$

Mol. mass 266.336 g/mol

Solubility profile:-White or practically white odorless powder, Melting point 146-148 degree, Freely soluble in methanol, sparingly soluble in alcohol, Slightly soluble in water and in isopropanolol.**[USP][9]**

Solubility profile:- Soluble in ethanol, Sparingly soluble in water, Slightly soluble in dichloromethane, Insoluble in ether.**[IP][10]**

Pharmacokinetic data

Bioavailability 40-50%

Protein binding 6-16%

Metabolism Hepatic<10%

Half-life 6-7hours

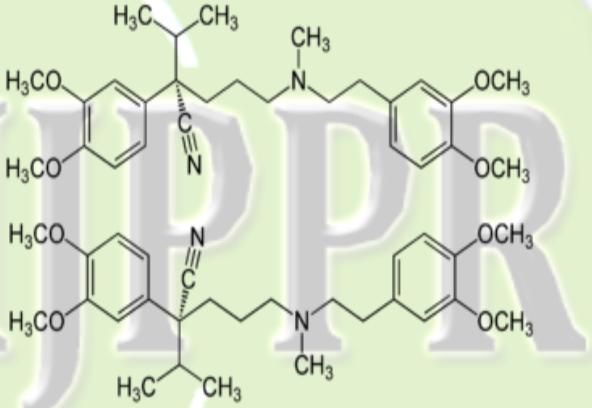
Excretion

Renal

Lactic (In lactiferous females)

Verapamil [11]

1: 1 mixture (racemic mixture)



Systematic (IUPAC) name (*RS*)-2-(3, 4-dimethoxyphenyl)-5-{[2-(3, 4-dimethoxyphenyl)ethyl]-(methyl)amino}-2-prop-2-ylpentanenitrile

Chemical data

Formula $C_{27}H_{38}N_2O_4$

Mol. mass 454.602 g/mol

Solubility profile: - White to practically white crystalline powder, Is practically odorless and has a bitter taste, Soluble in water, Freely soluble in chloroform, Sparingly soluble in alcohol, Practically insoluble in ether.**[USP][12]**

Solubility profile: -Freely soluble in chloroform, soluble in water, Sparingly soluble in ethanol, Practically insoluble in ether.**[IP][13]**

Pharmacokinetic data

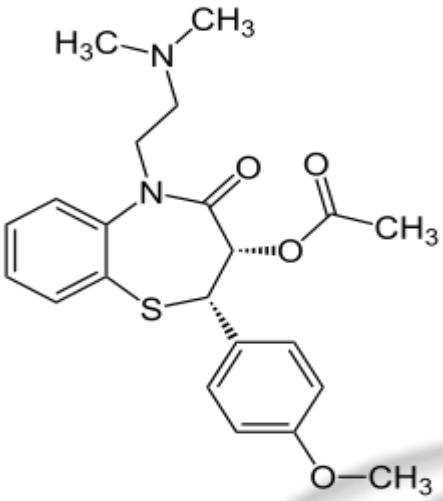
Bioavailability 35.1%

MetabolismHepatic

Half-life 2.8-7.4 hours

ExcretionRenal: 11%

Diltiazem[14]



Systematic (IUPAC) name*cis*-(+)-[2-(2-dimethylaminoethyl)-5-(4-methoxyphenyl) -3-oxo-6-thia-2-azabicyclo[5.4.0]undeca-7,9, 11-trien-4-yl]ethanoate

Chemical data

Formula$C_{22}H_{26}N_2O_4S$

Mol. mass 414.519 g/mol

Solubility profile: -White odorless crystalline powder or small crystals. Freely soluble in chloroform, In formic acid in methanol and in water, Sparingly soluble in dehydrated alcohol, Insoluble in ether. Melt at about 210 degree with decomposition.**[USP][15]**

Solubility profile: -Freely soluble in chloroform, in methanol, in water and in formic acid, sparingly soluble in ethanol, Insoluble in ether.**[IP][16]**

Pharmacokinetic data

Bioavailability 40%

MetabolismHepatic

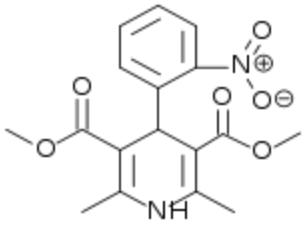
Half-life 3-4.5 hours

ExcretionRenal

Biliary

Lactic (in lactiferous females)

Nifedipine [17]



Systematic (IUPAC) name3, 5-dimethyl 2, 6-dimethyl-4-(2-nitrophenyl)-1, 4-dihydropyridine-3, 5-dicarboxylate

Chemical data

Formula$C_{17}H_{18}N_2O_6$

Mol. mass 346.335 g/mol

Solubility profile: - Yellow powder, is affected to exposure to light, practically insoluble in water, freely soluble in acetone.**[USP][18]**

Solubility profile: -Freely soluble in acetone and in chloroform. Sparingly soluble in ethanol, practically insoluble in water.**[IP][19]**

Pharmacokinetic data

Bioavailability 45-56%

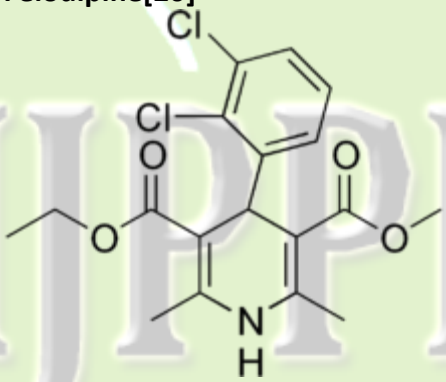
Protein binding 92-98%

Metabolism Gastrointestinal, Hepatic

Half-life 2 hours

Excretion Renal: >50%, Biliary: 5-15%

Felodipine[20]



Systematic (IUPAC) name3-ethyl 5-methyl 4-(2,3-dichlorophenyl)-2,6-dimethyl-1,4-dihydropyridine-3,5-dicarboxylate

Chemical data

Formula$C_{18}H_{19}Cl_2NO_4$

Mol. mass 384.259 g/mol

Solubility profile: -Light yellow to yellow, crystalline powder. Freely soluble in acetone and in methanol. Very slightly soluble in heptane.Insoluble in water.**[USP][21]**

Pharmacokinetic data

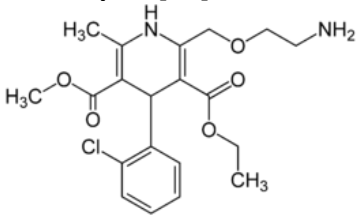
Bioavailability 15%

Metabolism Hepatic

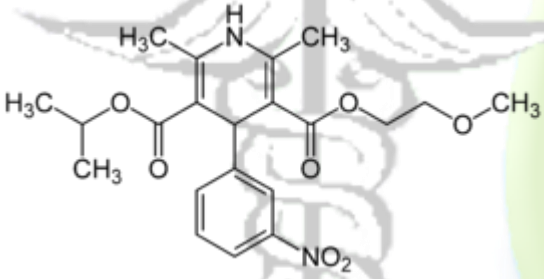
Half-life 21.2 (20) h**[22]**

Excretion Renal

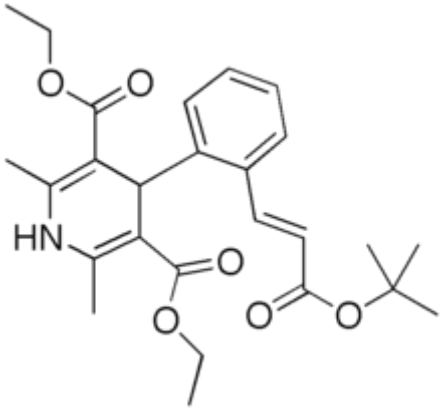
Amlodipine[23]



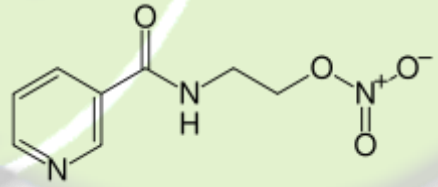
Systematic (IUPAC) name(*RS*)-3-ethyl 5-methyl 2-[(2-aminoethoxy)methyl]-4-(2-chlorophenyl)-6-methyl-1,4-dihydropyridine-3,5-dicarboxylate
Chemical data
Formula $C_{20}H_{25}ClN_2O_5$
Mol. mass 408.879 g/mol
Solubility profile:- A white or almost white powder.Freely soluble in methanol.Sparingly soluble in alcohol,Slightly soluble in 2-propanol and in water.**[USP][24]**
Solubility profile:-Slightly soluble in water,Freely soluble in methanol,sparingly soluble in ethanol,slightly soluble in 2-propanolol.**[IP][25]**
Pharmacokinetic data
Bioavailability 64 to 90%
MetabolismHepaticNikhil and Nilesh filed a patent on amlodipine
Half-life 30 to 50 hours
Excretion Renal
Nimodipine[26]



Systematic (IUPAC) name 3-(2-methoxyethyl) 5-propan-2-yl 2,6-dimethyl-4-(3-nitrophenyl)-1,4-dihydropyridine-3,5-dicarboxylate
Chemical data
Formula $C_{21}H_{26}N_2O_7$
Mol. mass 418.44 g/mol
Solubility profile:-Light yellow to yellow,crystalline powder affected by light.Freely soluble in ethyl acetate.Sparingly soluble in alcohol.Practically insoluble in water.Ehibits Polymorphism.**[USP][27]**
Pharmacokinetic data
Bioavailability 100% (Intravenous) 13% (Oral)
Protein binding 95%
Metabolism Hepatic
Half-life 8–9 hours
Excretion Feces and Urine
Lacidipine[28]



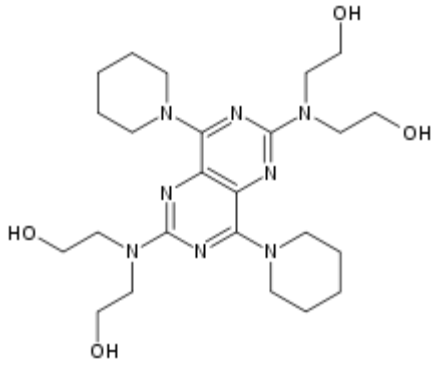
Systematic (IUPAC) name3,5-diethyl 4-{2-[(1*E*)-3-(*tert*-butoxy)-3-oxoprop-1-en-1-yl]phenyl}-2,6-dimethyl-1,4-dihydropyridine-3,5-dicarboxylate
Chemical data
Formula $C_{26}H_{33}NO_6$
Mol. mass 455.543 g/mol
Solubility Profile:-*lacidipine* is slightly *soluble*in*water*, while it is more *soluble* in some widely used solvents as ethanol. *Lacidipine*is strongly lipophilic**[29]**
Pharmacokinetic data
Bioavailability:-*Lacidipine* was rapidly and extensively absorbed after oral dosing, in both species. Oral *bioavailability*was up to 26% in rat and up to 32% in dog,**[30]**
Protein binding: - *Protein binding*: 99.7%**[31]**
Metabolism:-Kidney**[32]**
Half-life:- The drug has a plasma *half-life* of 7-8 hours.**[33]**
Nicorandil[34]



Systematic (IUPAC) name:-2-[(pyridin-3-ylcarbonyl)amino]ethyl nitrate
Chemical data
Formula:- C8H9N3O4
Mol. Mass:- 211.175 g/mol
Solubility Profile:-Drug is freely soluble in water. White to off-white needle crystal powder**[35],[36]**
Pharmacokinetic data
Bioavailability 75 to 80%
Protein binding 25%
Metabolism Hepatic
Half-life 1 hour

Excretion Renal (21%)

Dipyridamole[37]



Systematic (IUPAC) name:-2,2',2",2"'-(4,8-di(piperidin-1-yl)pyrimido[5,4-d]pyrimidine-2,6-diyl)bis(azanetriyl)tetraethanol

Chemical data

Formula C24H40N8O4

Mol. mass 504.626 g/mol

Solubility profile:- Intense yello crystalline powder or needless.Very soluble in methanol,in alcohol and in chloroform.Slightly soluble in water,Very slightly soluble in acetone and in ethyl acetate. **[USP][38]**

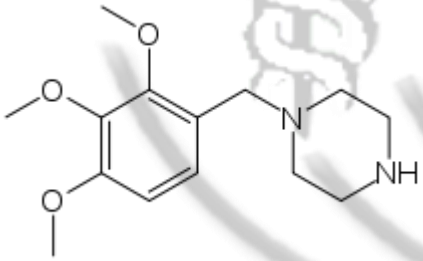
Pharmacokinetic data

Protein binding 99%

Metabolism Hepatic

Half-life Alpha (40 mins), Beta (10 Hours)

Trimetazidine[39]



Systematic (IUPAC) name1-(2,3,4-trimethoxybenzyl)piperazine

Chemical data

Formula C14H22N2O3

Mol. mass 266.336 g/mol

Solubility profile:-freely soluble in water**[40]**

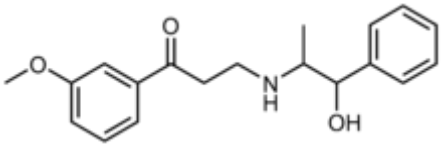
Pharmacokinetic data

Excretion mainly renal (unchanged)

Half-life:- The *half-life of trimetazidine* is 3-4 hours**[41]**

Protein binding:-*Protein binding* affinity is low. (16%),**[42]**

Oxyfedrine[43]



Systematic (IUPAC) name3-[(2-Hydroxy-1-methyl-2-phenylethyl)amino]-1-(3-methoxyphenyl)propan-1-one

Chemical data

Formula C19H23NO3

Mol. mass 313.39 g/mol

Solubility profile:-freely soluble in water, sparingly soluble in alcohol**[44]**

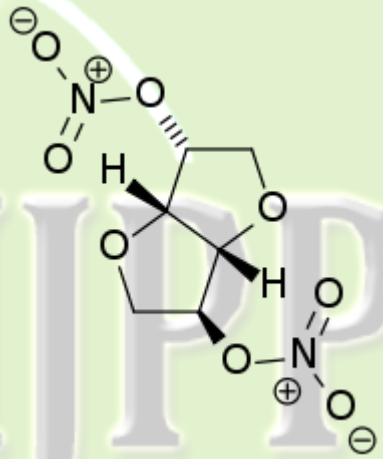
Pharmacokinetic data

half-life:-3-4 hours**[45]**

Protein binding:-(~90%)**[46]**

Excretionwas not excreted into urine unchanged.Lung**[47]**

Isosorbidedinitrate[48]



Systematic (IUPAC) name 1,4:3,6-dianhydro-2,5-di-O-nitro-D-glucitol

Chemical data

Formula C6H8N2O8

Mol. mass 236.136 g/mol

Solubility profile:- Ivory-White, Odorless powder. Undiluted Isosorbide nitrate is very slightly soluble in water, Very soluble in acetone, Freely soluble in chloroform, Sparingly soluble in alcohol. **[USP][49]**

Solubility profile:- It is very soluble in acetone, Freely soluble in chloroform, Sparingly soluble in ethanol, Very slightly soluble in water. [IP]**[50]**

Pharmacokinetic data

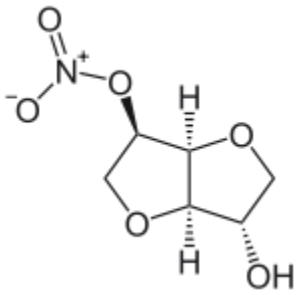
Bioavailability 10–90%, average 25%

Metabolism Hepatic

Half-life 1 hour

Excretion Renal

Isosorbidemononitrate[51]



Systematic (IUPAC) name8-nitrooxy-2,6-dioxabicyclo[3.3.0]octan-4-ol

Chemical data

Formula C6H9NO6

Mol. mass 191.139 g/mol

Solubility profile:- Ivory-White, Odorless powder. Undiluted Isosorbide nitrate is very slightly soluble in water, Very soluble in acetone, Freely soluble in chloroform, Sparingly soluble in alcohol**. [USP][52]**

Solubility profile:- It is very soluble in acetone, Freely soluble in chloroform, Sparingly soluble in ethanol, Very slightly soluble in water. **[IP][53]**

Pharmacokinetic data

Bioavailability >95%

Protein binding <5%

Metabolism Hepatic

Half-life 5 hours

Excretion Renal: 93%

Reference:-

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