of necrosis and fatty infiltration (fig.1d). Further investigations on the isolation and characterization of the active constituents of the above extracts are in progress.

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REFERENCES:

1. Gamble, J.S., In; Fischer, C.E.C., Eds., Flora of the Presidency of Madras, Vol. II, Adlard and Sons Ltd., London, 1921, 776.
2. Saldanha, C.J. In; Flora of Karnataka, Vol. I, Oxford & IBH Pub. Co., New Delhi, 1984, 336.
3. Nadakarni, A.K. In; Indian Materia Medica, Vol. I, Dhootapapeshwar Prakashan Ltd., Mumbai, 1954, 452.
4. Chopra, R.N., Nayar, S.L. and Chopra, I.C., In; Glossary of Indian Medicinal Plants, C.S.R.I., New Delhi, 1956, 505.
5. Kohli, R.P., Singh, N., Srinivasan, R.K. and Patil, T.K., **Indian J. Pharmacol.**, 1972, 4, 109.
6. Singh, N., Rastogi, S.K., Gupta, M.B., Patil, T.K and Kohli, R.P., **J. Res. Indian Med.**, 1971, 6, 229.
7. Suresh, C. and Sastry, M.S., **Indian J. Pharm. Sci.**, 1989, 5, 258.
8. Manjunatha, B.K., Krishna, V. and Pullaiah, T., In; Flora of Davanagere District, Karnataka, Regency Publications, Bangalore, 2003, 108.
9. Jaiprakash, B., Aland, R., Karadi, R.V., Savadi, R.V. and Hukkeri, V.I., **Indian Drugs**, 2003, 40, 296.
10. Mallory, H.T. and Evelyn, E.A., **J. Biol. Chem.** 1937,119, 481.
11. Kingsley, S.R. and Frankel. S., **J. Biol. Chem.**, 1939, 121, 131.
12. Reitman, S. and Frankel, S., **Am. J. Clin. Pathol.**, 1857, 28, 56.
13. Bessey, O.A., Lowery, D.H. and Brock, M.J., **J. Biol. Chem.**, 1964, 164, 321.
14. Dunnet, C.W., **Biometrics**, 1964, 20, 482.
15. Okuno, H., Hazama, H., Muraze, T., Shiozaki, and Someshima, Y.T., **Jap. J. Pharmacol.**, 1986, 41, 363.
16. Drotman, R.B. and Lawhorn, G.T. **Drug Chem. Toxicol.**, 1978. 1, 163.
17. Henry, J.B. In; Clinical Diagnosis and Management by Laboratory Methods, W.B. Sounders Co., Philadelphia. 1986, 241.
18. Recnagel, R.O., **Trends Pharmacol. Sci.**, 1983, 4, 129.

RP-HPLC Determination of Telmisartan in Tablet Dosage Forms

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A simple fast and precise reverse phase high performance liquid chromatographic method was developed for the determination of telmisartan from tablet dosage forms. A hypersil C18 BDS (250 mm×4.6 mm) from Thermo. In isocratic mode, mobile phase acetonitrile:methanol (60:40) was used. The flow rate was 1.2 ml/min, and eluent monitored at 245 nm.

Telmisartan is 3-N¹-methyl-2-benzimidazole derivative of N¹-4-(2-carboxyphenyl phenyl)-2-propyl, 4-methyl benzimidazole. It is obtained as a white crystalline powder with m.p. 221-223°. It is a new angiotensin II receptor antagonist for the treatment of essential hypertension[1-2]. It is useful in the treatment of mild to moderate hypertension, well tolerated with a lower incidence of cough than ACE inhibitors[3]. It is marketed as 40 mg tablets, taken once daily and in cases where target blood pressure is not achieved dosage could be increased to a maximum of 80 mg once daily[4]. A Milton Roy HPLC system consist of pump CM4000, spectro monitor 3100 of variable wave length detector, chromatography I/F module from Indtech instrument, auto injector A1000 (manual) with 20 micro liter loop and Shimadzu UV-1201 Spectro photometer were used.

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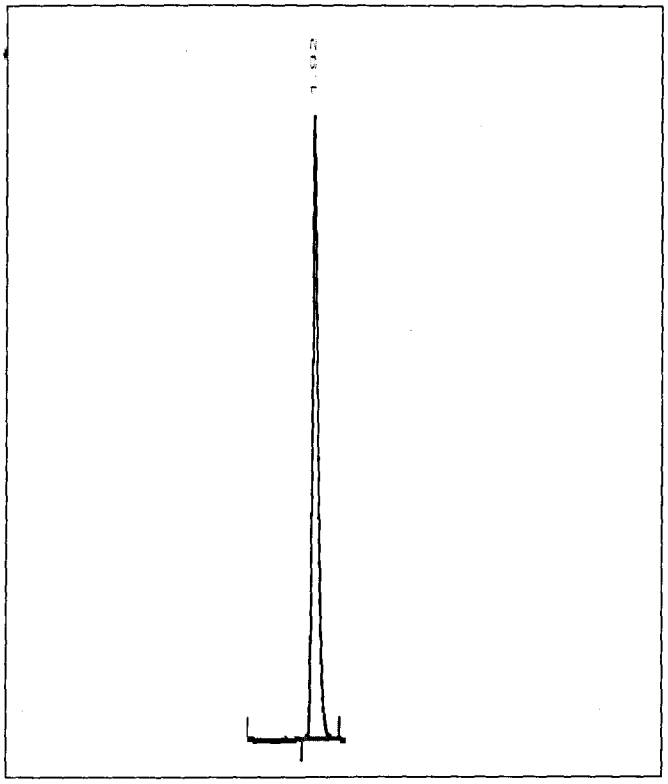

Fig. 1: A typical chromatogram of telmisartan

Standard telmisartan drug was procured from Glenmark Pharma Limited, Nasik and tablet formulations were purchased from local drug stores. Acetonitrile HPLC grade and methanol HPLC grade have been purchased from Merck, Mumbai, and were used in the ratio of 60:40. Acetonirile of HPLC grade (600 ml) and 400 ml of methanol of HPLC grade were taken, mixed, sonicated for 15 min and filtered through 4.5 micron filter paper. The filtered solvent system was further sonicated for an additional 5 min.

Fifty milligrams of telmisartan was taken in a 50 ml standard volumetric flask and dissolved in the mobile phase using a sonicator. The so prepared stock solution was further diluted to µg/ml concentration with the mobile phase. Linearity of the method was investigated by serially diluting the stock solutions to give a concentration range of 4 to 12 µg/ml. Calibration curve was constructed by plotting peak area ratio against concentration. The flow rate was maintained at 1.2 ml/min. Temperature of the column was kept at ambient, the average pressure was at 1225 psi and the effluent were monitored at 245 nm The mobile phase used was acetonitrile and methanol (60:40).

TABLE 1: ANALYSIS OF TABLETS

Name of company	Amount found mg/tablet+SD	%RSD	Percent of Label claim
Telma 1	40.1±0.29	0.22	100.2
Tetan 1	40.2±0.42	0.44	100.4

TABLE 2: RECOVERY STUDIES WITH TABLETS

Label claim (mg)	Amount added (mg)	Amount recovered (mg)	% recovery
Telma 40			
40	0	40.0	100.0
40	5	45.0	100.0
40	10	50.1	100.1
40	15	55.1	100.1
Tetan 40			
40	0	40.1	100.2
40	5	45.2	100.4
40	10	50.0	100.0
40	15	55.0	100.0

Telma 40 manufactured by Glenmark Pharmaceuticals Ltd, Nasik and Tetan 40 manufactured by Alembic Limited, Vadodara

Assay of two different marketed products with brand names Telma (40 mg), Healtheon-Division of Glenmark Pharmaceuticals Ltd., and Tetan (40 mg), Synx-A Specialties Division of Alembic, were performed. Twenty tablets of the above two different companies, marketed products were separately weighed and powdered. The powder equivalent to 40 mg of the drug (347.8 mg) was dissolved to obtain 10 µg/ml concentrations. Twenty microlitres of sample preparation were injected into injector of liquid chromatograph. A typical chromatographic peak was shown in fig. 1. From the peak response of telmisartan the amount of drug in sample was computed (Table 1).

To study the accuracy, reproducibility and the precision of the proposed method, recovery experiments were carried out. A fixed amount of pre-analyzed sample was taken and standard drug was added at three different concentrations and each level was repeated at least 4 times (Table 2).

The present method is a high performance liquid chromatographic method to determine telmisartan from its formulation. Various experiments were carried out to establish the method. The mobile phase wash Acetonitrile and methanol 60:40and was found to be ideal for the estimation of telmisartan. The elution followed was (RT-1.92 min). The mean recovery of telmisartan was (100.2%).The values of percent recovery and standard deviation show that the proposed method is reproducible, accurate and precise.

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REFERENCES

1. Ramsay, L.E., **Brit. Med. J.,** 1999, 635, 1993,.
2. McClellan, K.J. and Markham, A. **Drugs,** 1998, 56, 1044.
3. Anon., **the Formulary,** 1999, 18.
4. Neutel, J.M. and Smith, D.H.G., **Adv. Ther.,** 1998, 15, 217.

Reverse Phase High Performance Liquid Chromatographic Determination of Zidovudine and Lamivudine in Tablet Dosage Form.

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A simple, economical, fast and precise reverse phase high performance liquid chromatographic method has been developed for the simultaneous determination of zidovudine and lamivudine in from tablet dosage form. A BDS Hypersil C18 (5 micron 25 cm×4.6 mm) column from Thermo in isocratic mode with mobile phase o-phosphoric acid:methanol (70:30) buffered and adjusted to pH 5 by using triethylamine. The flow rate is 1.4 ml/min and effluent is monitored at 220 nm.

Zidovudine is 1-(3-azido-2,3-dideoxy-β-D-ribofuranosyl)-5-methylpyrimidine-2,4(1H,3H)-dione and lamivudine (2R-cis)-4-amino-1(2-hydroxy methyl)-1,3-oxathiolon-5-yl) 2-(1H)-pyrimidinone (-)-2'-deoxy-3'-thiacytidine. The combination is used in the treatment of human immuno deficiency virus infector HIV, the virus that causes AIDS[1-4]. Literature survey revealed that estimation of zidovudine and lamivudine by the USP method involved the determination of zidovudine by titrimetry and lamivudine in urine by HPLC[5]. Whereas, the proposed method describes the simultaneous determination of zidovudine and lamivudine by HPLC, which is simple, precise, rapid and selective.

High performance liquid chromatograph (Milton and Roy) equipped with a UV detector Spectrometer 3100, variable wavelength CM 4000 pump and chromatograph I/F module form Indetech instrument, Injector is manual, 20 µl loop and a Shimadzu UV-1201 Spectrophotometer were used.

Standard zidovudine from Strides Arco Laboratories Limited, Mumbai and lamivudine from Cadila Pharmaceuticals, Ahmedabad were procured. The combination formulations have been obtained from local drug stores. Methanol HPLC grade, water HPLC grade were used in this investigation. Potassium dihydrogen phosphate (6.8 g) was dissolved in water (1 l). Buffer (650 ml) and methanol (350 ml) were mixed and filtered through 45 µ filter paper and sonicated. Separate calibration curve was obtained. Solutions were prepared by taking varying concentrations of zidovudine (10 to 50 µg) and lamivudine (10 to 30 µg). Plotting graph area *vs.* concentration allowed checking linearity of detector response.

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