International Journal of Pharmacy Teaching & Practices 2015, Vol.6, Issue 2, 2100-2104.

Comparative Physicochemical and Phyto-Chemical Screening of Glucomap: An Herbal Antidiabetic Tablet

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Research Article

Please cite this paper as Satyaendra K. Shrivastava*[1], Dr. P.K. Dubey[1], Dr. B. Shrivastava[2], Dr. Pankaj Sharma[2]. Comparative Physicochemical and Phyto-Chemical Screening of Glucomap: An Herbal Antidiabetic Tablet. IJPTP, 2015, 6(2), 2100-2104.

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Abstract

The World Health Organization Expert Committee on diabetes has recommended that traditional medicinal herbs be further investigated. Thus, plants are a potential source of anti-diabetic drugs but this fact has not gained enough momentum in the scientific community. Plants used to treat diabetes are of considerable interest as they are recognizing to contain valuable medicinal properties in different parts of the plant species with desire properties. Several species of plant are used in the treatment of diabetes, a disease affecting large number of people worldwide. The present paper enumerates several species used in the treatment of diabetes. The present paper deals with standardization parameters of medicinal herbs present in glucomap, an herbal antidiabetic tablet. Various parameters viz., FOM, AS, SI, LOD etc were reported. Also, attempts were made to reveal the presence of active phyochemical present in the herbs and were compared with the standard drug.

Keywords: *Anti-Diabetes Medicinal Herbs, Physicochemical, Phytochemical Screening*

Introduction

Plants or their phytochemical constituents have been proven to have medicinal effects by rigorous science or have been approved by regulatory agencies such as the United States Food and Drug Administration or European Food Safety Authority. India is a country known for ancient scripts, the number system, invention of zero and Vedas. Medicines in India are used by about 60 percent of the world's population. These are not only used for primary health care not just in rural areas in developing countries, but also in developed countries as well where modern medicines are predominantly used. While the traditional medicines are derived from medicinal plants, minerals, and organic matter, the herbal drugs are prepared from medicinal plants only.[1-2] Antidiabetic herbal tablet, Glucomap contains *Enicostama littorale* Blume. (whole plant), *Phyllanthus niruri* Linn. (fruits), *Eugenia jamboloma* Linn. (seeds), *Eugenia jamboloma* Linn. (leaves), *Azadirachta indica* A. Juss. (leaves), *Terminalia arjuna* (bark), *Aegle marmelos* L. Correa (leaves), *Momordica charantia* Linn. (fruits).[3-4] The present work was undertaken to reveal the standardization parameters of these medicinal plants.

Material and Method

Selection, Collection and Authentication of Plant Material

The herbs viz., *Enicostama littorale* Blume. (whole plant), *Phyllanthus niruri* Linn. (fruits), *Eugenia jamboloma* Linn. (seeds), *Eugenia jamboloma* Linn. (leaves), *Azadirachta indica* A. Juss. (leaves), *Terminalia arjuna* (bark), *Aegle marmelos* L. Correa (leaves), *Momordica charantia* Linn. (fruits) were collected in the months Jan 2014 to August 2014 from the in and around local areas of Indore District of M.P. and identified & authenticated by Dr. S.N. Dwivedi, Professor & Head Dept. of Botany, Janata PG College, APS University, Rewa, M.P., and were deposited in

Laboratory, Voucher specimen No. JC/SS/01 to 08 was assigned.

Drying of Plant Material

The plant parts collected were dried under shade and were made to coarse powdered using grinder. The coarsely dried powdered were stored in air tight container for further use.

Standardization Parameters

The coarsely dried powdered plant materials were subjected to standard procedure for the determination of various physicochemical parameters. Successive Extraction of air dried plant material were carried by taking 100gm of drug using solvent viz., petroleum ether, ethanol and water. Preliminary phytochemical screening were performed as the standard protocol.[5-9]

Results and Discussion

Table 1: Physico-chemical evaluation of selected Medicinal herbs used in the treatment of Diabetes

S/No.	Parameters	Values Obtained (% w/w)							
		ELWP	PNF	EJS	EJL	AIL	TAB	AML	MCF
1.	Total ash (TA)	8.16	11.30	8.40	7.25	11.68	5.18	10.23	7.0
2.	Water soluble ash (WSA)	2.75	6.45	3.20	3.15	4.04	1.36	4.91	3.78
3.	Acid insoluble ash (AIA)	1.89	3.02	1.20	1.10	1.02	1.12	2.05	0.30
4.	Moisture content (MC)	2.25	4.89	4.51	3.92	1.20	2.93	1.03	3.48
5.	Swelling index (SI)	1.05	4.68	4.28	3.80	1.53	1.56	0.98	3.21
6.	Foreign organic matters (FOM)	1.02	1.92	1.31	1.50	1.84	1.91	1.35	0.9
7.	Water soluble extractive value	37.21	33.10	22.20	30.20	39.43	18.65	28.63	35.23
8.	Alcohol soluble extractive value	24.92	24.56	14.94	18.82	22.40	20.49	15.20	20.41
9.	Pet. ether soluble extractive value	10.25	18.32	27.30	19.42	18.30	12.41	9.89	9.58

All values are Mean, n=3. **Abbr**.: ELWP = *Enicostama littorale* (whole plant), PNF = *Phyllanthus niruri* (bhooamala), EJS = *Eugenia jamboloma* (seeds), EJL = *Eugenia jamboloma* (leaves), AIL = *Azadirachta indica* (leaves), TAB = *Terminalia arjuna* (bark), AML = *Aegle marmelos* (leaves), MCF= *Momordica charantia* (fruits)

Physicochemical evaluation

The physicochemical evaluation of selected medicinal herbs viz., *Enicostama littorale* Blume. (whole plant), *Phyllanthus niruri* Linn. (fruits), *Eugenia jamboloma* Linn. (seeds), *Eugenia jamboloma* Linn. (leaves), *Azadirachta indica* A. Juss. (leaves), *Terminalia arjuna* (bark), *Aegle marmelos* L. Correa (leaves), *Momordica charantia* Linn. (fruits) were carried out. Air dried material was used for quantitative determination of physiochemical values In this study ash values (total ash, acid insoluble ash and water soluble ash), moisture content, swelling index and foreign organic matters were determined. Comparative studies were performed and presented in table 1 and graph 1. Pet. ether, alcohol and water soluble extractives were determined and recorded. Alcohol and water extractive was determined as per WHO recommendations while petroleum ether soluble extractive was determined due to the medicinal attributes of the extract. Water soluble extractive was found to be very high in most of the extract when compared to other extractable matter in the drug. In some extract alcohol soluble extractive value was recorded more, whereas pet. ether soluble extractive value was found to be least.

Extraction of Plant Material

The shade dried coarsely powder of selected medicinal herbs viz., *Enicostama littorale* (whole plant), *Phyllanthus niruri* (fruits), *Eugenia jamboloma* (seeds), *Eugenia jamboloma* (leaves), *Azadirachta indica* (leaves), *Terminalia arjuna* (bark), *Aegle marmelos* (leaves), *Momordica charantia* (fruits) were extracted. The solvents were removed by distillation under reduced pressure and the resulting semisolid mass was vacuum dried using rotary flash evaporator. The percentage yields of Petroleum ether, ethanolic and aqueous extract of selected medicinal herbs along with their color, nature and pH were presented in table 2.

Table 2: Percentage yield of Pet. ether, ethanolic and aqueous extracts of selected Medicinal herbs used in the treatment of Diabetes

S./ No.	Extract	Estimated percentage (%w/w)	Color of extract	Nature of extract	pH
1.	PEEELWP	0.36	Light green	Semi Solid	7.03
2.	EEELWP	5.08	Green	Semi Solid	7.05
3.	AEELWP	9.45	Dark green	Solid Powder	7.00
4.	PEEPNF	1.25	Yellowish	Semi solid	7.20
5.	EEPNF	8.40	Pale green	Semi solid	7.01
6.	AEPNF	11.20	Brownish green	Powder	7.03
7.	PEEEJS	1.20	Light violet	Sticky	7.0
8.	EEEJS	10.28	Greenish violet	Sticky	7.20
9.	AEEJS	15.27	Dark violet	Semi solid	7.02
10.	PEEEJL	0.74	Pale yellow	Semi solid	7.03
11.	EEEJL	5.29	Greenish black	Sticky solid	7.20
12.	AEEJL	4.32	Blackish green	Semi solid	6.98
13.	PEEAIL	0.53	Light yellow	Semi powder	7.03
14.	EEAIL	7.39	Green	Semi Solid	7.05
15.	AEAIL	13.05	Brownish Green	Solid Powder	7.00
16.	PEETAB	2.30	Pale brown	Semi powder	6.99
17.	EETAB	8.54	Brown	Soild Solid	7.03
18.	AETAB	14.20	Blackish brown	Solid Powder	7.21
19.	PEEAML	3.65	Yellowish green	Sticky Solid	6.99
20.	EEAML	12.41	Dark Green	Semi Solid	7.02
21.	AEAML	3.60	Brown	Solid Powder	7.03
22.	PEEMCF	2.30	Green	Semi powder	7.0
23.	EEMCF	9.82	Greenish black	Sticky Solid	7.05
24.	AEMCF	11.40	Blackish green	Solid Powder	7.09

All values are Mean, n=3, **Abbr.:** PEE=Pet. ether extract, EE= Ethanolic extract, AE, Aqueous extract

Preliminary Phytochemical Screening of Extract and Glucomap Tablets

The extract obtained after extraction of plant material and of glucomap tablets were subject to phytochemical screening which revealed the present of various active phytoconstituents. The results were presented in table 3-6.

Conclusion

Standardization parameters such as physicochemical and phytochemical screening were performed on the various extracts of the medicinal herbs present in antidiabetic herbal tablet, glucomap. The results of physicochemical parameters revealed the data obtained were satisfactory. Preliminary phytochemical screening of the various extract and of glucomap tablets shows the similar results which disclosed the presence of various active phytoconstituents. The information obtained from these results will be useful in finding out the genuity of the drug. Also, the manufacturer can utilize them for identification and selection of the raw material for drug production.

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Table 3: Preliminary phytochemical screening of petroleum ether extract of selected Medicinal herbs used in the treatment of Diabetes

S/No.	Constituents	Ethanolic Extracts of Medicinal Herbs							
		ELWP	PNF	EJS	EJL	AIL	TAB	AML	MCF
1.	Carbohydrates	+	+	-	-	+	+	-	+
2.	Glycosides	-	+	-	-	-	-	+	-
3.	Alkaloids	+	+	+	+	+	+	+	+
4.	Protein & Amino acid	+	-	+	+	-	+	-	+
5.	Tannins & Phenolic compounds	+	+	+	+	-	+	+	-
6.	Flavonoids	+	+	+	+	-	+	+	+
7.	Fixed oil and Fats	-	-	-	-	-	-	-	-
8.	Steriods & Triterpenoids	+	-	+	+	+	+	-	-
9.	Waxes	-	-	-	-	-	-	-	-
10.	Mucilage & Gums	-	-	-	-	-	-	-	-

Abbr. - = Absent, + = Present; ELWP = *Enicostama littorale* (whole plant), PNF = *Phyllanthus niruri* (bhooamala), EJS = *Eugenia jamboloma* (seeds), EJL = *Eugenia jamboloma* (leaves), AIL = *Azadirachta indica* (leaves), TAB = *Terminalia arjuna* (bark), AML = *Aegle marmelos* (leaves), MCF= *Momordica charantia* (fruits)

Table 4: Preliminary phytochemical screening of ethanolic extract of selected Medicinal herbs used in the treatment of Diabetes

S/No.	Constituents	Pet. Ether Extracts of Medicinal Herbs							
		ELWP	PNF	EJS	EJL	AIL	TAB	AML	MCF
1.	Carbohydrates	-	-	-	-	-	+	+	+
2.	Glycosides	-	-	-	-	-	-	-	-
3.	Alkaloids	+	+	+	+	-	+	-	-
4.	Protein & Amino acid	-	-	+	+	-	-	-	+
5.	Tannins & Phenolic compounds	+	+	+	+	-	+	-	-
6.	Flavonoids	+	+	+	+	-	+	+	-
7.	Fixed oil and Fats	-	-	-	-	-	-	-	-
8.	Steriods & Triterpenoids	+	-	+	+	-	+	-	-
9.	Waxes	-	-	-	-	-	-	-	-
10.	Mucilage & Gums	-	-	-	-	-	-	-	-

Abbr. - = Absent, + = Present; ELWP = *Enicostama littorale* (whole plant), PNF = *Phyllanthus niruri* (bhooamala), EJS = *Eugenia jamboloma* (seeds), EJL = *Eugenia jamboloma* (leaves), AIL = *Azadirachta indica* (leaves), TAB = *Terminalia arjuna* (bark), AML = *Aegle marmelos* (leaves), MCF= *Momordica charantia* (fruits)

Table 5: Preliminary phytochemical screening of aqueous extract of selected Medicinal herbs used in the treatment of Diabetes

S/No.	Constituents	Aqueous Extracts of Medicinal Herbs							
		ELWP	PNF	EJS	EJL	AIL	TAB	AML	MCF
1.	Carbohydrates	+	+	-	-	+	+	+	+
2.	Glycosides	-	+	-	-	-	-	-	-
3.	Alkaloids	+	+	+	+	+	+	+	+
4.	Protein & Amino acid	+	-	+	+	-	+	-	+
5.	Tannins & Phenolic compounds	+	+	+	+	-	+	-	-
6.	Flavonoids	+	+	+	+	-	+	+	+
7.	Fixed oil and Fats	-	-	-	-	-	-	-	-
8.	Steriods & Triterpenoids	+	-	+	+	+	+	-	+
9.	Waxes	-	-	-	-	-	-	-	-
10.	Mucilage & Gums	-	-	-	-	-	-	-	-

Abbr. - = Absent, + = Present; ELWP = *Enicostama littorale* (whole plant), PNF = *Phyllanthus niruri* (bhooamala), EJS = *Eugenia jamboloma* (seeds), EJL = *Eugenia jamboloma* (leaves), AIL = *Azadirachta indica* (leaves), TAB = *Terminalia arjuna* (bark), AML = *Aegle marmelos* (leaves), MCF= *Momordica charantia* (fruits

Table 6: Preliminary phytochemical screening of Petroleum ether, ethanolic and aqueous extract of Glucomap Tablet

S/No.	Constituents	Extracts of Glucomap		
		PEEGT	EEGT	AEGT
1.	Carbohydrates	+	+	+
2.	Glycosides	-	-	-
3.	Alkaloids	-	+	+
4.	Protein & Amino acid	+	+	+
5.	Tannins & Phenolic compounds	+	+	+
6.	Flavonoids	-	+	+
7.	Fixed oil and Fats	-	-	-
8.	Steriods & Triterpenoids	+	+	+
9.	Waxes	-	-	-
10.	Mucilage & Gums	-	-	-

Abbr. - = Absent, + = Present, PEEGT = Pet. ether extract of Glucomap tablets, EEGT = Ethanolic extract of Glucomap tablets, AEGT = Aqueous extract of Glucomap tablets

AUTHORS' CONTRIBUTIONS

Authors contributed equally to all aspects of the study.

PEER REVIEW

Not commissioned; externally peer reviewed.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.