

Comparative Proximate Nutraceutical study of Poor man's pulse, Horsegram [*Macrotyloma uniflorum*] with the other common legume crops: A Review

Abstract

Horsegram is an underutilized drought hardy crop and mainly neglected by the farmers in northern region of India. However, the present study reveals the hidden comparative analysis of nutraceutical use with well-known legumes like *Phaseolus vulgaris*, *Vigna mungo*, *Cicer arietinum*, *Vicia faba*, *Cajanus cajan*, *Vigna radiata*, *Pisum sativum* and *Lens culinaris*. This pulse crop is the excellent sources of carbohydrate, protein and dietary fiber. This present study shows that amount of energy in horsegram falls in the range of 376.12-377.21Kcal/100g which is maximum than the other legumes. The ash, protein, dietary fibres, carbohydrates, fat and starch content of horse gram falls in the range (2.24% to 5.16 %), (18.15% to 28.8%), (5% to 16.3%), (50% to 63.4%), (1.10 to 1.9%) and (31.86% to 47.5%) respectively. Horsegram is found to be less fat and more dietary food fibres than the most common legumes. Hence, it is the excellent source of food for diabetic patient. Unique anti-urolithiatic activity of horsegram is well known against calcium oxalate crystals, calcium phosphate crystals and uric acid crystals. Anticholelithiatic, Anti-histaminic, Hemolytic, Larvicidal, Proteinase inhibition and Anti-HIV are among other unique medicinal properties of horsegram which are not reported in any other legumes.

Keywords: Horsegram, Anti-HIV, Anti-urolithiatic, calcium oxalate

Introduction

Legumes are ranked second after cereals which act as the main component of human diet since times (**Singh and Maiti, 2016; Mishra et al., 2018; Kaur and Saini, 2018; Bhadana et al., 2013**) and are considered to be the most important source of food for human as well as animal (**Bhatt and Karim, 2009**). A variety of Legumes are grown worldwide particularly *Vigna mungo*, *Vicia faba*, *Cicer arietinum*, *Phaseolus vulgaris*, *Vigna radiata*, *Pisum sativum*, *Lens culinaris* and *Cajanus cajan* etc. (**Rao, 1982**). Among all legumes, Lentil is mentioned in the cropping system of ancient Egypt and faba beans are in Bible. Legumes are used by the Romans in pastures and for soil improvement dating 37 B (**Allen and Allen, 1981**). The domestic consumption of pulses in India was 186.5 lakh tonnes and are all consumed by the peoples in various ways e.g. food (**Duranti, 2006; Khokhar and Chauhan, 1986**) because of possessing high protein content, vitamins, amino acids and pharmaceutical importance. It provides dry and green fodder for animals, producing green manure which improves soil health and adds nutrient into the soil (**Parul, 2014; Bhatt and Karim, 2009; Vietmeyer, 1986**). Protein-energy malnutrition is the serious problem due to the increasing population, decrease of fertile land and degradation of natural resources (**Deshpande, 1992 and Steiner, 1996**). Legumes are the excellent source of protein and are emphasized as an active substitute to animal protein (**Famurewa and Raji, 2005**). It has become a necessity in the developing countries to overcome the problem of hunger and malnutrition by exploring the underutilized legumes (**Coulter et al., 1988; Chel-Guerrero et al., 2002; Arinathan et al., 2003**). Underutilized legumes are considered to be the source of dietary requirements of the rural peoples during drought and famine situations (**Magbagbeola et al., 2010**).

Horsegram is one of the underutilized and unexplored food legume (**Aiyer, 1990; Reddy et al., 2008**) with good source of carbohydrates, protein and energy (**Bravo et al., 1999**). This crop is highly adaptable to low fertility land (**Witcombe et al., 2008**), drought (**Bhardwaj and Yadav, 2012**), salinity (**Reddy et al., 1998**) and heavy metal stresses (**Reddy et al., 2005**). Beside all these useful benefits of horse gram, this food crop is being neglected by the farmers of the Punjab in India due to the negative image attached to this crop as 'Poor man's food'. The main reasons of its underutilization are like forgetting its agronomic practices. However, there are numerous references existing in the traditional medicinal system of horse gram showing its medicinal

consequences like anti-diabetic (**Raj and Reddy, 2016; Parthsarathi and Sexena, 2013**), anticalcifying (**Bijarnia et al., 2009; Atodariya et al., 2013**), anti-hypercholesterolemic (**Sengupta et al., 2012; Kumar et al., 2013**), analgesics (**Ashraf et al., 2018; Fatima et al., 2018**), antioxidant (**Singh et al., 2012; Ravishankar et al., 2012**) and larvicidal properties (**Gupta et al., 2011**) and hence it is all-important to investigate the comparative analysis of nutrient compositions of underutilized food legume crop horse gram with other well-known legumes. The present population of world is increasing at a rapid pace and hence, it is very difficult to fulfill the needs of daily energy consumption in upcoming years. The present study is useful to access the hidden value of nutraceutical components of horse gram and where it stands among the others unique well known legumes. Each and every legume provide good amount of energy which is useful to human beings for living. The energy value in different legumes on dry weight basis (Kcal/100g) is shown in Table1.

Table 1: Energy value in different legumes on dry weight basis (Kcal/100g)

Horsegram	Kidney bean	Black gram	Chick pea	Faba bean	Pigeon pea	Mung bean	Pea	Lentil
376.12-377.21 (Jain <i>et al.</i> , 2012)	120.35-125.45 (Hadzic <i>et al.</i> , 2013)	211 (Maneemegalai and Nandakumar, 2011)	347 (Woleung et al., 1968; Gopalan et al., 1980)	320 (Woleung et al., 1968; Gopalan et al., 1980)	301 (Woleung et al., 1968; Gopalan et al., 1980)	310 (Woleung et al., 1968; Gopalan et al., 1980)	93 (Das <i>et al.</i> , 1993)	302 (Woleung et al., 1968; Gopalan et al., 1980)

The amount of energy in horsegram falls in the range of 376.12-377.21Kcal/100g (**Jania et al., 2012**) followed by Chick pea (347 Kcal/100g) which is more than many other legumes and less is present in the Pea is 93Kcal/100g (**Table 1**). The amount of energy amount in different ranges in different legumes i.e. 120.35-125.45 Kcal/100g in Kidney bean (**Hadzic et al., 2013**), 211 Kcal/100g in Black gram (**Maneemegalai and Nandakumar, 2011**), 320 Kcal/100g in Faba bean, 301 Kcal/100g in Pigeon pea, 310 Kcal/100g in Mung bean and 302 Kcal/100g in Lentil (**Woleung et al., 1968; Gopalan et al., 1980**).

Each legume is known for the presence of different nutraceutical contents which play various roles in metabolic activities of humans and animals. Each component fulfills the energy requirement of all the human beings and act as the energy fodder source for animals also. The neutraceutical contents of most important pulses i.e. Black gram (*Vigna mungo*), Faba bean (*Vicia faba*), Chick pea (*Cicer arietinum*), Kidney bean (*Phaseolus vulgaris*), Mung bean (*Vigna radiata*), Pea (*Pisum sativum*), Lentil (*Lens culinaris*) and Horse gram (*Macrotyloma uniflorum*) vary in different concentrations with respect to ash, protein, dietary fibre, fat, carbohydrates, starch content, vitamins (Fat soluble and water soluble) and minerals (micronutrients and macronutrients) respectively.

Ash

The residues especially minerals are left after the substance is completely burnt called as ash. These minerals are very useful in the various metabolic and biological reactions such as growth, development, flowering and reproduction etc. take place in the plant metabolic machinery as well as useful for human beings and for environment also. Ash content of horsegram vary among all pulses shown in Table 2.

Table 2: Comparative details of Ash (%) in different legumes

Horsegram	Kidney bean	Black gram	Chick pea	Faba bean	Pigeon pea	Mung bean	Pea	Lentil
3.8	3.67	3.67	4.2	3.97	4.02	3.27	2.74	5.7
(Sudha <i>et al.</i> , 1995)	(Marquezi <i>et al.</i> , 2016)	(Kakati <i>et al.</i> , 2010)	(Yadav and Chen, 2007; Petterson <i>et al.</i> , 1997)	(Singh <i>et al.</i> , 2014)	(Akande <i>et al.</i> , 2010)	(Kakati <i>et al.</i> , 2010)	(Brenes <i>et al.</i> , 1993)	(Savage, 1988)
4.5	4.4	3.1	3.43	3.6	5	3.9	3.52	2.7
(Mandle <i>et al.</i> , 2012)	(Audu and Aremu, 2011)	(Shaheen <i>et al.</i> , 2012)	(Kinfe <i>et al.</i> , 2015)	(Elsheikh <i>et al.</i> , 1999)	(Kachare <i>et al.</i> , 2017)	(Habibullah and Shah, 2007)	(Rodrigues <i>et al.</i> , 2012)	(Khan <i>et al.</i> , 1987)
2.7	4.47	3	3.53	2.81	4	2.91	4.1	
(Sreerama <i>et al.</i> ,	(Barampama and	(Blessing and Gregory,	(Daur <i>et al.</i> , 2008)	(Ahmed, 1997)	(Lawn and Troedson,	(Shaheen <i>et al.</i> , 2012)	(Savage and Deo,	

2012)	Simard, 1993)	2010)			1990)		1989)
3.34		3.12	3.2	3.6	5.8	2.97	4.08
(Ramteke <i>et al.</i> , 2016; Ranasinghe <i>et al.</i> , 2017)		(Soris <i>et al.</i> , 2010)	(Khan <i>et al.</i> , 1995)	(Abdulrahim, 2004)	(Aparna, 2004; Pawar <i>et al.</i> , 2009 and Oke, 2014)	(Pasha <i>et al.</i> , 2011)	(Bishnoi, 1991)
5.16		3.47		3.03	3.8		4.15
(Ravindran <i>et al.</i> , 2009)		(Modgil <i>et al.</i> , 2019)		(Ali and Ahmed, 1982)	(Sharma, 2011)		(Das <i>et al.</i> , 1993)
5				7.4			3.44
(Khader and Rao, 1986)				(Tinay <i>et al.</i> , 1993)			(Pawar <i>et al.</i> , 1994)
2.24				3.6			4.0
(Marimuthu and Krishnamoorthi, 2013)				(Duke, 1981)			(Alam, 2002)
				4.21			
				(Siddig, 1999)			

The ash content of horse gram falls in the range from 2.24% (Marimuthu and Krishnamoorthi, 2013) to 5.16 % (Ravindran *et al.*, 2009). The maximum amount of ash content is 4.47% in kidney bean (Barampama and Simard, 1993), 3.67 in black gram (Kakati *et al.*, 2010), 4.2 in chick pea (Yadav and Chen, 2007; Petterson *et al.*, 1997), 7.4 in faba bean (Tinay *et al.*, 1993), 5.8 in pigeon pea (Aparna, 2004; Pawar *et al.*, 2009 and Oke, 2014), 3.9 in mung bean (Habibullah and Shah, 2007), 4.15 in pea (Das *et al.*,

	2011)	Sumathi, 2015)	(Siddig, 1999)	2002)	(Anwar et al., 2007)	1998)
25 (Khader and Rao, 1986)		25.4	29.1	23		26.32
25.3 (Sudha et al., 1995)		(Khan et al., 1995)	(Welch and Griffiths, 1984)	(Lawn and Troedson, 1990)		(Kosson et al., 1994)
26.1 (Osama et al., 2002)			27.5	25		25.41
			(Vetter, 1995)	(Sethi and Chatterjee, 1997)		(Alam, 2002)
28.8 (Patil and Deshmukh, 1985)			30.63	26.38		
			(Ahmed, 1997)	(Aparna, 2004; Pawar et al., 2009; Oke, 2014 and Vasave, 2003)		
				22		
				(Sharma, 2011)		

The maximum amount of protein content is found to be 39% in faba bean (Elsayed, 1994; Elsheikh et al., 1999) followed by 38.3% in pea (Pandey and Gritton, 1975), 36.4% in lentil (Hawtin et al., 1977), 31.4% in chick pea (Sindhu and Sumathi, 2015) and 31.32% in mung bean (Anwar et al., 2007) respectively. The maximum protein content in horsegram is found to be 28.8% (Patil and Deshmukh, 1985) which is maximum than kidney bean (25.23%) (Shelli-Dessert and Bliss, 1991; Celmeli et al., 2018), black gram (27.87%) (Kakati et al., 2010), Pigeon pea (26.38%) (Aparna, 2004; Pawar et al., 2009; Oke, 2014 and Vasave, 2003).

Dietary fibers

Dietary fibers play the important role in the digestive system of the human beings. These fibers are present in the various cereals, fruits, seeds and vegetables contain the indigestible parts of plant's material which keeps the digestive system healthy. The dietary fibers details of all these legumes are shown in Table 4.

Table 4: Comparative details of Dietary fibers (%) in different legumes

Horsegram	Kidney bean	Black gram	Chick pea	Faba bean	Pigeon pea	Mung bean	Pea	Lentil
16.3 (Sreerama <i>et al.</i> , 2012)	3.91 (Megat <i>et al.</i> , 2016)	4.90 (Kakati <i>et al.</i> , 2010)	22.7 (Yadav and Chen, 2007)	13.49 (Singh <i>et al.</i> , 2014)	6.6 (Saxena, 2010)	4.12 (Kakati <i>et al.</i> , 2010)	9.9 (Savage and Deo, 1989)	5.9 (Savage, 1988)
5.63 (Ravindran <i>et al.</i> , 2009; Ranasinghe <i>et al.</i> , 2017)	3.6 (Audu and Aremu, 2011)	3.0 (Shaheen <i>et al.</i> , 2012)	16.91 (Kinfe <i>et al.</i> , 2015)	8.08 (Abdulrahim, 2004)	7.52 (Akande <i>et al.</i> , 2010)	6.8 (Habibullah and Shah, 2007)	7.10 (Rodrigues <i>et al.</i> , 2012)	4.7 (Khan <i>et al.</i> , 1987)
12.14 (Marimuthu and Krishnamoorthi, 2013)		3.67 (Modgil <i>et al.</i> , 2019)	9.89 (Daur <i>et al.</i> , 2008)	9.03 (Elsheikh <i>et al.</i> , 1999)	8.1 (Sinha, 1977)	4.1 (Shital and Yeshwant, 2013)	10.30 (Bishnoi, 1991)	
5 (Ray, 1970)		3.2 (Alagsundaram and Kanchana, 2015)	11.2 (Khan <i>et al.</i> , 1995)		6.6 (Ayenan, 2017)	2.9 (Shaheen <i>et al.</i> , 2012)	4.49 (Das <i>et al.</i> , 1993)	
5.7 (Rao and Sampth, 1979; Sudha <i>et al.</i> , 1995)					5 (Lawn and Troedson, 1990)	2.2 (Hussain <i>et al.</i> , 2010)	8.29 (Alam, 2002)	

Maximum amount of dietary fibres is found to be 22.7% (Yadav and Chen, 2007) in chick pea followed by horsegram (16.3%) (Sreerama *et al.*, 2012). Horsegram is the good source of dietary fibres in human diet and noticed that it has more dietary amount food than the others legumes excluding Chick pea. Kidney bean, black gram and mung bean has minimum amount of fibres with 3.6% (Audu and Aremu, 2011), 3% (Shaheen *et al.*, 2012) and 2.2% (Hussain *et al.*, 2010) respectively. Faba bean, pigeon pea, pea and lentil is also a good source of dietary fibres with 13.49% (Singh *et al.*, 2014), 8.1% (Sinha, 1977), 10.30% (Bishnoi, 1991) and 5.9% (Savage, 1988) respectively.

Carbohydrates

The amount of carbohydrate content, sugar, fat and starch are also varying among all the pulses at different concentrations. This content plays the important role in seed dormancy and protects the young embryo from environmental shocks and later on nourishes it in unfavorable conditions. The details of their carbohydrate amount in different legumes are shown in Table 5.

Table 5: Comparative details of Carbohydrate (%) in different legumes

Horsegram	Kidney bean	Black gram	Chick pea	Faba bean	Pigeon pea	Mung bean	Pea	Lentil
58.32	57.19	63.70	47.42	57.3	58.7	58.9	56.6	59.7
(Marimuthu and Krishnamoorthi, 2013)	(Megat <i>et al.</i> , 2016)	(Ofuya and Akhidue, 2005)	(Alajaji and El-Adawy, 2006)	(Ofuya and Akhidue, 2005)	(Ofuya and Akhidue, 2005; Sinha, 1977)	(Habibullah and Shah, 2007)	(Ofuya and Akhidue, 2005)	(Ofuya and Akhidue, 2005)
55	63.7	58.73	56.30	53.58	60.48	61.2	74.0	55.0

(Ray, 1970)	(Ofuya and Akhidue, 2005)	(Modgil <i>et al.</i> , 2019)	(Kinfe <i>et al.</i> , 2015)	(Singh <i>et al.</i> , 2014)	(Kachare <i>et al.</i> , 2017)	(Ofuya and Akhidue, 2005)	(Savage and Deo, 1989)	(Khan <i>et al.</i> , 1987)
63.4	49	63.60	42.2	48.3	62.63	56.7		
(Subba and Sampath, 1979)	(Audu and Aremu, 2011)	(Tresina and Mohan, 2011)	(Sindhu and Sumathi, 2015)	(Elsheikh <i>et al.</i> , 1999)	(Aparna, 2004; Pawar <i>et al.</i> , 2009 and Oke, 2014)	(Shital and Yeshwant, 2013)		
61			55	54.8	65			
(Sudha <i>et al.</i> , 1993)			(Khan <i>et al.</i> , 1995)	(Tinay <i>et al.</i> , 1993)	(Sharma, 2011)			
50				50.8	58.8			
(Jogyabathi <i>et al.</i> , 2001)				(Siddig, 1999)	(Faris and Singh, 1990)			
57.2				48.12				
(Gopalan <i>et al.</i> , 2007)				(Abdulrahim, 2004)				

The carbohydrate content of horse gram varies from range 50 (Jogyabathi *et al.*, 2001) to 63.4% (Subba and Sampath, 1979). The maximum amount was noticed in pea with 74% (Savage and Deo, 1989) followed by pigeon pea with 65% (Sharma, 2011). Black gram and kidney bean has 63.7% carbohydrate content (Ofuya and Akhidue, 2005). The maximum amount of carbohydrate content in chick pea, faba bean, mung bean and lentil is 56.30% (Kinfe *et al.*, 2015), 57.30% (Ofuya and Akhidue, 2005), 61.2% (Ofuya and Akhidue, 2005) and 59.7% (Ofuya and Akhidue, 2005) respectively. Horsegram is the good source of carbohydrate content on dry weight basis and having more amount than chick pea, faba bean, mung bean and lentil.

Fat

Plants store their energy in the form of carbohydrates, but at the time of ripening they change these oxygen rich components into carbon rich triglycerides i.e. lipids and fat. These are both useful for the seeds at the time of germination by providing energy. The amount of fat varies in large amount in among all the pulses and the maximum amount of fat found in pea from the collected data. The details of fat in different legumes are shown in **Table 6**.

Table 6: Comparative details of Fat (%) in different legumes

Horsegram	Kidney bean	Black gram	Chick pea	Faba bean	Pigeon pea	Mung bean	Pea	Lentil
1.10 (Ranasinghe <i>et al.</i> , 2017)	1.33 (Celmeli <i>et al.</i> , 2018)	1.54 (Kakati <i>et al.</i> , 2010)	7.42 (Yadav and Chen, 2007)	1.58 (Singh <i>et al.</i> , 2014)	1.9 (Saxena, 2010)	1.60 (Kakati <i>et al.</i> , 2010)	6.1 (Savage and Deo, 1989)	3.7 (Gaydou <i>et al.</i> , 1983)
1.30 (Ramteke <i>et al.</i> , 2016)	1.01 (Barampama and Simard, 1993)	1.01 (Shaheen <i>et al.</i> , 2012)	7.01 (Kinfe <i>et al.</i> , 2015)	2.2 (Tinay <i>et al.</i> , 1989)	2.3 (Ayenan, 2017)	1.90 (Habibullah and Shah, 2007)	1.18 (Brenes <i>et al.</i> , 1993)	4.3 (Khan <i>et al.</i> , 1987)
1.4 (Sreerama <i>et al.</i> , 2012)		2.94 (Soris <i>et al.</i> , 2010)	5.1 (Khan <i>et al.</i> , 1995)	0.7 (Ali and Ahmed, 1982)	2.93 (Kachare <i>et al.</i> , 2017)	1.30 (Shital and Yeshwant, 2013)	2.79 (Bishnoi, 1991)	
1.25 (Marimuthu and Krishnamoorthi, 2013)		1.77 (Modgil <i>et al.</i> , 2019)	6.48 (Jukanti <i>et al.</i> , 2012)	1.08 (Elsheikh <i>et al.</i> , 1999)	2 (Lawn and Troedson, 1990)	1.35 (Shaheen <i>et al.</i> , 2012)		
1.32 (Worthington <i>et al.</i> , 1972; Subba and Sampath, 1979)		1.30 (Saharan <i>et al.</i> , 2002)	8.83 (Jukanti <i>et al.</i> , 2012)	1.61 (Siddig, 1999)	3.1 (Aparna, 2004; Pawar <i>et al.</i> , 2009; Oke, 2014 and Vasave, 2003)	1.24 (Butt and Batool, 2010)		

1.9

(Osama *et al.*, 2002)

10.20

(Jukanti *et al.*, 2012)

1.2

(Welch and Griffiths, 1984)

1.2

(Sharma, 2011)

1.12

(Pasha *et al.*, 2011)

1.70

(Ahmed, 1997)

A huge variation of fat is noticed among the legumes and it varies from range 1.10 % (Ranasinghe *et al.*, 2017) to 1.9% (Osama *et al.*, 2002). The maximum amount of fat is noticed in chick pea with 10.20 % (Jukanti *et al.*, 2012) followed by pea with 6.1 % (Savage and Deo, 1989) respectively. The fat content of horsegram is found to be less than that of black gram, chick pea, faba bean, pigeon pea, mung bean, pea and lentil with 2.94% (Soris *et al.*, 2010), 10.20% (Jukanti *et al.*, 2012), 2.2% (Tinay *et al.*, 1989), 3.1% (Aparna, 2004; Pawar *et al.*, 2009; Oke, 2014 and Vasave, 2003), 6.1% (Savage and Deo, 1989) and 4.3% (Khan *et al.*, 1987) except kidney bean and mung bean respectively.

Starch

Plants convert the carbon dioxide from atmosphere, sunlight and water into oxygen and glucose. Glucose is stored in plant tissue for food and energy principally by photosynthesis. Starch is the reserve food material of the plant mainly composed of glucose molecules linked in long chains. The details of starch in different legumes are shown in **Table 7**.

Table 7: Comparative details of Starch (%) in different legumes

Horsegram	Kidney bean	Black gram	Chick pea	Faba bean	Pigeon pea	Mung bean	Pea	Lentil
31.86	42.21	41.72	83.9	52.7	48.2	56.87	48.6	52.8
(Ravindran <i>et al.</i> , 2009)	(Marquezi <i>et al.</i> , 2016)	(Kakati <i>et al.</i> , 2010)	(Alajaji and El-Adawy, 2006)	(Ofuya and Akhidue, 2005)	(Ofuya and Akhidue, 2005)	(Kakati <i>et al.</i> , 2010)	(Ofuya and Akhidue, 2005)	(Ofuya and Akhidue, 2005)

31.86	56.5	47.9	56.3	44.16	53	53.6	40.31
(Ranasinghe <i>et al.</i> , 2017)	(Ofuya and Akhidue, 2005)	(Ofuya and Akhidue, 2005)	(Yadav and Chen, 2007)	(Singh <i>et al.</i> , 2014)	(Ayenon, 2017; Saxena, 2010)	(Ofuya and Akhidue, 2005)	(Brenes <i>et al.</i> , 1993)
47.5			50.0		55		40.95
(Chavan <i>et al.</i> , 2013)			(Ofuya and Akhidue, 2005)		(Lawn and Troedson, 1990)		(Rodrigues <i>et al.</i> , 2012)
							46.04
							(Richter, 1976)

The starch content of horse gram varies from range 31.86 (Ravindran *et al.*, 2009) to 47.5% (Chavan *et al.*, 2013). The maximum amount of starch is noticed in chick pea with 83.9% (Alajaji and El-Adawy, 2006) followed by mung bean with 56.87% (Kakati *et al.*, 2010), kidney bean with 56.5% (Ofuya and Akhidue, 2005), pigeon pea with 55% (Lawn and Troedson, 1990), lentil with 52.8%, faba bean with 52.7%, pea with 48.6% and black gram with 47.9% (Ofuya and Akhidue, 2005) respectively.

Pharmaceutical Importance of horsegram

According to Ayurveda, Siddha and Unani, the various parts of the horsegram are used in the medicinal use for thousands of years for various disorders (Ranasinghe and Ediriweera, 2017). Traditionally, It is used as a medicinal herb for amenorrhea, bile and kidney stones, conjunctivitis, piles, diabetes mellitus, dysuria (Chunekar and Pandey, 1998). The boiled concentrated liquor of seeds is also useful in the management of postpartum syndrome and promote the discharge of lochia (Jayaweera, 1981). Infusion of seeds with cow's milk is useful in the management of helminthes disorders (Kamat, 2002). The seeds powder is consumed with curd for gastric ulcers (Bhagwan and Kashyap, 1980). Decoction of root is given for leucorrhoea and its plant juice provides a good cure in diarrhea (Yadava and Vyas, 1994). The seeds of *M. uniflorum* are used to prepare drugs such as Kulatthadi Pralepa (paste), Kulatthadi Gruta (ghee), Kulattha Yusha, Dhanyamla (sour gruel) and Dantimuladi Kwatha (Ranasinghe and Ediriweera, 2017).

The pharmaceutical important properties include anti-microbial, anti-obesity, analgesic, anti-inflammatory, anti-diabetic, anti-histaminic, anti-oxidant, anti-obesity, diuretic, hemolytic, hepatoprotective, anti-diabetic and anti-hypertensive properties like the others legumes (**Kaundal et al., 2019**) however this crop has many unique medicinal properties which makes it more unique than the others legumes and these are shown in Table 8.

Table 8: List of unique pharmaceutical use of horsegram with references

Sr. No.	Pharmacological use	References
1	Anti-urolithiatic against calcium oxalate crystals	Bijarnia <i>et al.</i> , 2009
2	Anti-urolithiatic against calcium phosphate crystals	Kieley <i>et al.</i> , 2008
3	Anti-urolithiatic against uric acid crystals.	Ahmad <i>et al.</i> , 1992
4	Proteinase inhibition.	Bhartiya <i>et al.</i> , 2015
5	Anticholelithiatic activity.	Bigoniya <i>et al.</i> , 2014
6	Larvicidal and Anorectic Activities:	Bhuvaneshwari, 2014
7	Anti-HIV Activity:	Gupta <i>et al.</i> , 2011

Conclusion:

This crop is usually neglected by the farmers and this present study clearly accessed that it is the richer source of nutritional and unique pharmaceutical importance like others well-known legumes. Horsegram is the richer source of energy, dietary fibre and protein

like the other legumes. It contains less fat and starch which is the most useful food for diabetic patient. Its pharmaceutical use like anti-urolithiatic activity against calcium oxalate crystals, calcium phosphate crystals and uric acid crystals makes it more unique than the others legumes.

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