1. Introduction

Camels are the most numerous species of animals in the arid areas of Asia and Africa, particularly in East African counties (Sudan, Ethiopia, Somalia, Kenya and Djibouti). One humped camel (Camelus dromedary), is an important livestock species uniquely adapted to hot and arid environment more than any other domestic animals (Schwartz and Dioli, 1992).

The total Camels population in the world is estimated to be about 26million (Food and Agriculture organization FAO, 2011) .Ministry of Animal Resources, Fisheries and Range (MARFR, 2012) estimated the total camel population in Sudan as 4.75 million. Camels are considered to be good source of milk and meat, and are used for other purposes such as transportation and sport racing (Kaufman, 2005). Camel milk is one of the main components of the pastoral community's basic diet, at the same time it is an important source of essential components and vitamin C (Farah et al., 1993).

Camel milk has an important role in human nutrition in the hot regions and arid countries. The milk contains all the essential nutrients found in bovine milk (EL-Agamy, et. al. 1998). Camel milk has closely similar chemical characteristics to cow milk. The period of lactation is longer than that of cattle; however, the daily production is lower. The advantage of camels is that in arid or marginal areas, the camel needs little or no supplementation feeding and husbandry necessary for cattle. However, mean daily milk yield of 5 to 13 kg per day is common (AL-Ani,2004). Mean while, most of the camel milk in the Sudan is drunk fresh and sometimes sour (fermented) (Garis) or with tea (sbanes). Moreover processing and manufacturing of camel milk into milk products like

butter, ghee, cheese, ice cream, etc, not found except in some limited researches (Eisa and Mustafa, 2011)

Camel milk can certainly play more important role in the prevention of malnutrition than it does today. Growing and raising foodstuffs for the rapidly increasing human population is especially precarious in the hot and arid zones of the world-the very areas where the camel is one of the few animals not only to survive, but also to benefit man .Milk is the main food obtained from a herd of camels (Yagil ,1982).The milk has many properties that make it very useful choice as camel's milk is used in some parts of the world to cure certain diseases(Attia et.al.2001) .There were reports that camel milk has medicinal properties suggesting that this milk contains protective proteins which may have possible role for enhancing immune defense mechanism(Yagil,1982). Camel milk also contains higher amount of zinc (Hansen et. al .1982).Camel milk has insulin like activity, regulatory and immunomodulatory functions on βcell. Camel milk exhibits hypoglycemic effect when given as an adjunctive therapy, which might be due to presence of insulin/insulin like protein in it and possesses beneficial effect in the treatment of food allergies, crohns disease and autism (Shabo and Yagil,2005). Recently, camel milk was also reported to have other potential therapeutic properties, such as anti carcinogenic, (Magieed, 2005),anti diabetic (Agrawal et.al, 2007), and anti hypertensive (Quan et. al.2008), and has been recommended to be consumed by children. Moreover, camel urine was also reported to be used as treatment for diarrhea (AL-Attas, 2008). EL-Agamy et. al .(1992) reported that camel milk contains good amount of lysozme , lactoferrin, lactoperoxidase , immunoglobulin G, and secretory immunoglobulin A ,these antimicrobial factors were present at significantly greater

concentrations in camel milk and were more heat stable compared with those in cow and buffalo milks .

Objective:-

- To study the use of camel milk for curing certain diseases in Khartoum State.

2. Literature Review

2.1 Camel in Sudan:

Sudan is well-known as one of the largest camels (camelus dormedarius) populated countries in the world (Ministry of animal resources, Sudan, 1999). Camels are important in the culture of the nomadic people of Asia and Middle East; supply food (meat and milk), fuel (the fecal pellets), fiber (clothing, ropes), leather, transportation (packing riding), and racing. Special breeds of dromedaries were developed for riding and became important in the mobilization of military expeditions (Murray, 2010). The distribution areas of camels in the Sudan are mainly in the arid and semi-arid areas North of about 13N. According to Agab(1995) camel population is more concentrated in Kordofan ,Darfur and the North State; In East Sudan, they are mainly found in Butana area and parts of the Red Sea State .The different camel breeds which were classified into pack and riding camels(Babiker,2000) are owned by tribes, of which Kwahla, Rashida, Shukria, Lahaween, Hadandwa, BinAmer, Batahin and Busharieen and others may be given. Recently concentrated camel farms were established in irrigated areas, mainly for the production of milk and meat (Hermas et. al. 1995).

2.2 Camel milk production:

Lactating female camels are very persistent in the daily milk production during the dry season when milk production of all other domestic species is very low. Furthermore, camel milk is much more nutritious than cow milk. It is lower in fat and lactose and higher in potassium, iron and vitamin C. It is normally drunk fresh .Camel milk has closely similar chemical characteristics to cow milk .The period of lactation is longer than that of cattle; however, the daily production is lower. The advantage of camels is that in arid or marginal areas , the camel needs little or no

supplementation for milk production versus the full supplementary feeding and husbandry necessary for cattle .Generally there are certain factors influencing the milk yield ,including nutritional, water availability ,genetics ,reproduction and health status ,breeds ,stage of lactation ,milking frequency and presence of the calf (AL-Ani,2004).Camels are known to survice in arid and desert countries . These pastoralist areas and conditions make it difficult to estimate camel milk production. ALhaj and ALkanhal (2010) reported, that other major factors including breed ,feeding and management conditions , lactation number and stage of lactation affected the production of camel milk .The average of daily camel milk yield , lactation length and lactation yield have been reviewed by number of researchers and reported by Yagil (1982), Farah (1996) and Yagoob and Nawaz(2007) .Field (1979) estimated daily milk yield of camels at 21 liters in second week of lactation and decreases to 4.80 to 2.21 liters by the sixteenth week of lactation .Depending on management and environmental conditions , the average daily milk yield varying from 3.5 to 10 liters and can reach 40 liters in exceptionally good camels ,while the lactation yield ranged between 2000 and 6000 liters. According to (Eissa and Mustafa, 2011) Sudanese camel milk yield can reach 10 kg of milk per day in early lactation and good conditions and declines to 2 kg milk per day in the late lactation and bad condition otherwise a range between 5-10 kg per day. Alhaj and AL Kanhal (2010) found that most camel milk products are consumed locally by families and their animals, Furthermore (Haddadin et. al. 2008) revealed that fresh camel milk and their products have unique flavor and good nutritional values: therefore it can compete in the market if it is packed in an attractive packaging to maintain acceptable sensory properties such as taste, aroma color and texture during their shelf life.

2.3 Composition of camel milk:

Camel milk is composed of different elements including water ,fat ,protein , sugar ,vitamins ,enzymes , in addition to sodium ,calcium ,florine ,phosphors ,potassium ,manganese ,zinc ,sulphur and aluminm (Murad, 2000). The major component of camel milk in average were :86.6, 4.33, 4.02,4.21, and 0.8% for water, fat, protein, lactose and ash, depending on age of animal, feed quality, environmental conditions and lactation period (Abdel Aziz, 2006).

AL-Ani, (2004) reported, the composition of camel milk is similar to that of cattle and goat, is generally opaque white in color and low in carotene, which is a precursor of vitamin A. It has sweet and sharp taste, but sometimes can also be salty .The type of fodder and availability of drinking water causes the changes in taste of camel milk. Total solids depend upon the hydration status that ranged between 9-16% in which range of 3.5-5.2% for total protein, 2.9-5.5% for fat content, 2.1-5.8 for lactose and 0.6-1.0 for ash .According to Konsupayeva et. al. (2009) geographical origin and seasonal variations were found to be the most effective factors in camel milk composition. The changes in camel milk composition could be due to several factors including analytical measurement procedures, camel diet, climate, water availability, livestock management, and other factors

2.3.1 Water Content:-

Water is the most important factor that effects camel milk composition. The water content of the camel milk fluctuates from 84 to 90 %(AL-Ani , 2004).

2.3.2 protein :-

The protein percentage in camel milk decreased more, especially the casein content due to the increase in heat in summer (Soliman et. al. 2006).The concentration of protein in camel milk varies between 2.0-

5.5% according to Farah(1993) and ELamin and Wilex (1992) .The milk protein in Sudanese camel was estimated to range from (3.3%) to (4.7%) according to(Dirar,1993) .

According to (Basmail, 1987) ,the casein content in camel is less than that of cow milk .

2.3.3 Fat:-

The fat content in camel milk varies between 2.5 to 5.9% with mean of 4.9% and the ratio of fat to total solids average 31.6%. (AL-Ani, 2004).The variation in fat content of camel milk is related to the type of breed, feeding status and the stage of the lactation (Abu-Lehia, 1989).

2.3.4 Lactose:-

Lactose is the major carbohydrate in milk of most mammals. The content in camel milk ranged from 4.8 -5.8% slightly higher than the lactose content in cow's milk. (AL-Ani, 2004).

2.3.5 Minerals and Vitamins:-

The minerals content of camel milk expressed in ash ranges from 0.6 to 0.8% according to (AL-Ani, 2004).As given by Farah (1993), the concentration of the major salts in camel milk are slightly lower than cow's milk. Camel milk is rich in vitamin C as explained by Knoess (1979), Thiagarajan (2001) and Basmail (1417).٥ As lactation progresses, the vitamin C increases (Bestuzheva, 1964) and the levels of vitamin C are three times that of cow milk and one half that of human milk (Gast et. al. 1969). Camel milk is also rich in Nisine but poor in vitamin A and H (Basmail, 1417٥).Camel milk contains vitamin C, A, D, B1, B2, B12, B6 and vitamin H. as given by Gihad(1995).

2.4 Nutritive value of camel milk :-

Camel's milk was found to contain approximately770 calories (cal) or 293 kilo jole (kj) energy per kg camel milk. About 4kg of camel milk are sufficient to meet full caloric requirements of an adult human being and

1.8(kg) would provide him with the entire daily protein requirements (Khanna, 1999).

2.4.1 Milk protein:

The main component of milk, which has major impact on nutritional value and technological suitability, is protein. Milk protein is heterogeneous group of compounds that differ in composition and properties. They are divided into casein complexes and whey protein fractions. Casein is the most important protein in milk, while the proportion of whey proteins is relatively low, (Guo et.al.2007).

Camel milk is a good substitute for human milk as it does not contain β-lacto globulin, a typical milk protein characteristic of ruminant milk. Another crucial anti-allergenic factor is that the functional components of camel milk include immunoglobulin similar to those in human milk, which are known to reduce children's allergic reactions and strengthen their future response to foods (Shabo et. al., 2005). El-Hatmi et. al.

(2007) reported, camel milk contains higher amounts of antibacterial substances for example, lysozyme, lactoferrin, and immunoglobulin as compared to cow and buffalo milk.

2.4.2 Milk Lipids:-

Fat is the major substance defining milk's energetic value and makes a major contribution to the nutritional properties of milk, as well as to its technological suitability. Milk fat globules have an average diameter of less than 0.1μm to approximately 18μm (El-Zeini, 2006).Cholesterol is present in the milk fat globule membrane (MFGM) and it accounts for 95% of the sterols of milk fat. Camel milk is also unique concerning it's fatty acid profile. It contains 6 to 8 times less of the short chain fatty acids compared to milk from cows, goats, sheep, and buffalo .(Ceballos et. al.2009).

2.4.3 Milk mineral components:

Milk is an important source of mineral substances, especially calcium, phosphorus, sodium, potassium, chloride, iodine, magnesium, and small amounts of iron .The main mineral compounds of milk are calcium and phosphorus, which are substantial for bone growth and the proper development of newborns. The high bioavailability of these minerals influences the unique nutritional value of milk. Camel milk is the rich in these minerals (Al-Wabel, 2008).

2.4.4 Milk Vitamins:

Milk is a valuable source of vitamins, both water-soluble and fat-soluble ones. Camel milk is a kind of exception because of it is high concentration of vitamin C. Camel milk contains 3 times more vitamin C than cow milk does ,and 6 times more than human milk .This is highly important in desert areas ,where fruits and vegetables are scarce. Therefore, camel milk is often the only source of vitamin C in the diet of inhabitants of those regions. (Haddadin et. al.2008).

The level of vitamin A, E and B1 were reported to be low in camel milk compared to the cow milk. Cow milk contains 99.6±62.0µg% β-carotene it is not detected in camel milk. The concentration of vitamin C in camel milk in early and late lactation has been reportedc5.26±0.47 and 4.84±0.02 mg% respectively. The vitamin C content in camel milk is two to three folds higher in camel milk compared to cow milk. The level of vitamin A, E and B1 were higher in camel colostrums than mature camel milk. However, the vitamin C content remains higher in mature camel milk the higher vitamin C content may be attributed to the more synthetic activity in the mammary tissues during early phase of lactation that declined as lactation advanced. (Stahl et al, 2006). The low pH due to the vitamin C content stabilizes the milk and can be kept for relatively longer periods. The availability of relatively higher amount of vitamin C in raw

camel milk is of significant relevance from the nutritional point as vitamin C has powerful anti-oxidant action. Camel milk can be an alternative source of vitamin C under harsh environmental conditions in the arid and semiarid areas (Mal et. al. 2007).

2.5 The medical significance of camel's milk:

Unique composition and nutritional values of camel milk are well known from ancient times for its beneficial health effects.

The medical significance of camel's milk was documented in the Sunnah before 1400 years by prophet Mohamed peace Be Upon Him. Fermented camel milk can be considered as a good food of high nutritive and therapeutic applications. Meanwhile, the high content of antimicrobial agents in camel milk may explain its potential as an antiviral activity against diarrhea causing viruses (Mona et. al.2010). Also Alhaj and ALkanhal (2010) mentioned that camel milk has hypocholesterolaemic ,hypoglycaemic ,antimicrobial and hpoallegenicity effects. Camel milk plays a significant role in human diet in arid countries and hot regions .It is just like the bovine milk in its unique from other ruminant milk in term of it is composition as well as it is functionality ,as it is contains a high concentration of immune globulins and insulin.

Furthermore, it is high in vitamins (A, B2, C and E) and minerals (Sodium, potassium, iron, Copper, Zinc and magnesium) and low in protein sugar and cholesterol. Vitamins present in camel milk have antioxidant activity and helpful in controlling tissue damage caused by harmful substances. Raw camel milk as well as it's fermented products are used as curative agents to mange constipation, diarrhea, stomach ulcers, wound, liver disorders and to improve ovulation of female ovaries. Moreover, camel milk is full of evenly balanced nutritional constituents and also displays a wide variety of biological actions that influence growth metabolic responses towards nutrients absorption, digestion and

fight against diseases. It allows maintaining a positive micro flora, encourages development of bifido-bacteria and therefore, can be recommended for use as in variety of products as functional food. Overall camel milk is beneficial with enriched nutrients that are good for health. (Seher et. al. 2013).

2.6 Medical properties and uses of camel milk:-

Camel's milk is used in some parts of the worlds as cure for diseases. Knoess,(1982) mentioned , in India camel's milk had been used as therapy for dropsy, jaundice, problem of the spleen, tuberculosis, asthma, anemia and piles. Rao et. al. (1970) mentioned, in Ethiopia camel milk is used for increasing sexual impotence. Eltayeb and Elamin.(2007) explained, fresh camel milk is best for cleaning digestive system. Wernery ,et. al

(2003) repoported that recent data suggested that camel's milk contained medicinal properties to treat different ailments such as autoimmune Disease, Juvenile diabetes, booster of immune system, stress, peptic ulcers and skin cancer, Yagil(1982)added that chronic hepatitis was often being treated with camel's milk and was also given to sick elderly and very young people because it is believed to contribute especially well by bone formation .(Yasin and Walid 1957).

Yagil, (1982) noted that the belief among the Bedouins of the Sinai Peninsula was that an internal disease could be cured by drinking camel's milk. He also reported that the milk is believed to be of such strength and to have such health properties that all the bacteria are driven out of the body; however, this belief is only for camels that eat certain shrubs and bushes. Benkerroum et. al. (2004) found that the camel's milk and colostrums samples had bacteriostatic effect against the pathogenic strains of Escherichia coli and Listeria monocytogenes. Zayed, (2012) reported in the Sudan, fermented camel's milk is used to cure

Leishmaniasis or Kalazar. The patient had to live on Gariss alone as food for a long period after which it was claimed that he would be fully cured. Agrawel et. al. (2005) mentioned the utilization of camel's milk for people with type diabetes. Khalifa (2007)

reported that camel's milk can be used for treatment of diabetes and high cholesterol patients.

2.7 Diseases involved in treatment by camel milk:

2.7.1 Diabetes:

According to AL-Ani (2004) recent studies have found that one of the camel milk proteins has many characteristics similar to insulin, and it does not form coagulum in acidic environments. This lack of coagulum formation allows the camel milk to pass rapidly through the stomach together with the specific insulin like protein/insulin and remains available for absorption in the intestine; whereby radioimmunoassay of camel milk has revealed a high concentration of insulin.

Although, much more probable is that camel milk contains insulin-like small molecule substances that mimic insulin interaction with its receptor. (Ajamaluddin et. al. 2012).

2.7.2 Prevention and treatment of infertility :-

It is very rare to find infertility or impotence among men who frequently drink fresh camel milk. Also, there are records of treatment of infertility in women which physicians failed to treat by ordinary therapy. (AL-Ani, 2004).

2.7.3 General fatigue:-

Camel's milk has been used to treat people suffering from chronic fatigue and sexual impotence. (AL-Ani, 2004).

2.7.4 Milk allergies :-

The fact that camel milk lacks β-lactoglobulin and a new β-casein the two powerful allergens in cow milk. (Beg et. al.1986), makes the camel milk

attractive for children suffering from milk allergies ,(Makinen-kijunen and Palosne,1992).

Children with severe food allergies improved rapidly with camel milk. It appears that camel milk has a positive effect in children with severe food allergies. The reactions are rapid and long lasting.(Restani et. al . 1999).

2.7.5 Crohn's Disease:-

This disease is becoming an epidemic in many countries. Lately increasing evidence points to a primary bacterial infection by Mycobacterium could spread via cow milk as it unaffected by pasteurization. As the bacteria belongs to the family of tuberculosis and as camel milk has been used to treat tuberculosis, it becomes apparent that the powerful bactericide properties of camel milk and have a positive effect on the healing process. In addition, those immune globulins attack the anti-DNA and restore the immune system. (Urazakov and Bainazarov, 1991).

2.7.6 Autism:

Autistic children drinking camel milk have had amazing improvements in their behavior and diets. (Yagil, 2004). Enterocolitis, a symptom in many autistic children is often accompanied by Helicobacter pylori infection, lactose deficiency, and pancreas insufficiency. It has been suggested that the reaction of persons who suffer from a deficient immune response to camel milk (Shabo et. al. 2005) .Hamers(1998) explained,

small immunoglobulin probably pass from the camel's blood into its milk and then into the human blood stream. Here their comparative simplicity, high affinity, specificity, and potential to reach and interact with active sites allow for penetration of dense tissues to reach the antigen, explaining the positive actions of camel milk in autoimmune diseases in general.According to Laila and Nader (2013) extensive studies

have demonstrated that oxidative stress plays a vital role in the pathology of several neurological diseases, including autism spectrum disorder (ASD).

2.8 Observations about therapeutic effect of camel milk on certain diseases:-

2.8.1 Autism:-

Buie, et.al.(2002) mentioned, a young 4-year old girl (from New York), who suffered from severe periods of rage; picky-eater; no eye contact or other cognitive or communicative skills and did not talk was considered normal after only 40 days of drinking camel milk and started talking, wanted hugs, was calm, had a varied diet, and was working on computer.

A 15-yearold boy with serious symptoms of autism, similar to those of the young girl, began drinking camel milk because of enterocolitis and showed improved cognitive and communication skills within 1 month.

Although he never spoke, a professional examination (by the Israel National Institute) revealed that he was no longer autistic but did suffer from brain damage.

In a hostel for autistic youths, all about 21 years of age, camel milk was consumed each day for 2 weeks, replacing all other milk, within 24 hours, the youths became quieter, one stopped self-mutilation, and another had improvement of persistent mouth sores. This phenomenon of rapid reaction to the milk was seen with other autoimmune diseases as well, although the initial reaction was rapid, longer periods were required to obtain a lasting effect.(Buie,et.al 2012).

2.8.2 Insulin Dependent Diabetes Mellitus (IDDM):

In India a comparison between conventionally treated juvenile diabetes with those also drinking camel milk showed that group drinking the milk had significantly reduced blood sugar and reduced Hb levels and the amounts of injected insulin were also significantly reduced .Agrawel et. a. (2002).

.In Israel diabetic drinking camel milk showed similar results as in clinical trials. A case in particular was a young girl who started drinking camel milk within 2 weeks of the diagnosis of IDDM. After 8 weeks she was getting minimal dose of insulin while blood sugar declined to 80mg%, According to Amjad et. al. (2013).

2.8.3 Liver diseases:-

It was shown that camel milk had a beneficial action on chronic liver patients. Based on this fact, camel's milk was given to a young child with biliary atresia whose diet consisted only of cow's milk and whose condition was rapidly deteriorating. Following camel milk feeding the deterioration was diminished and the child remained in good condition until a liver surgery was performed (AL-Ani, 2004).

3. Material and Methods

The study of the traditional utilization of camel milk for curing certain disease was conducted in Khartoum State (Khartoum, Khartoum North and Omdurman) during the period of December 2015toApril 2016. This was done by using a questionnaire distributed randomly to 75 individuals, 25per each areas, who consumed camel milk as therapeutic for specific diseases. The questionnaires and data in concern was enhanced by more supporting information obtained from reviewing previous literature, scientific journal, social media (internet, T.V ,Radio , Magazines and news papers), as well as personal communications.

Data tabulation by frequency tables and simple percentage method of analysis were performed.

4. Results and Discussion

4.1 Results

Results of direct questionnaire are given in following figures and tables which are discussed in 4.2

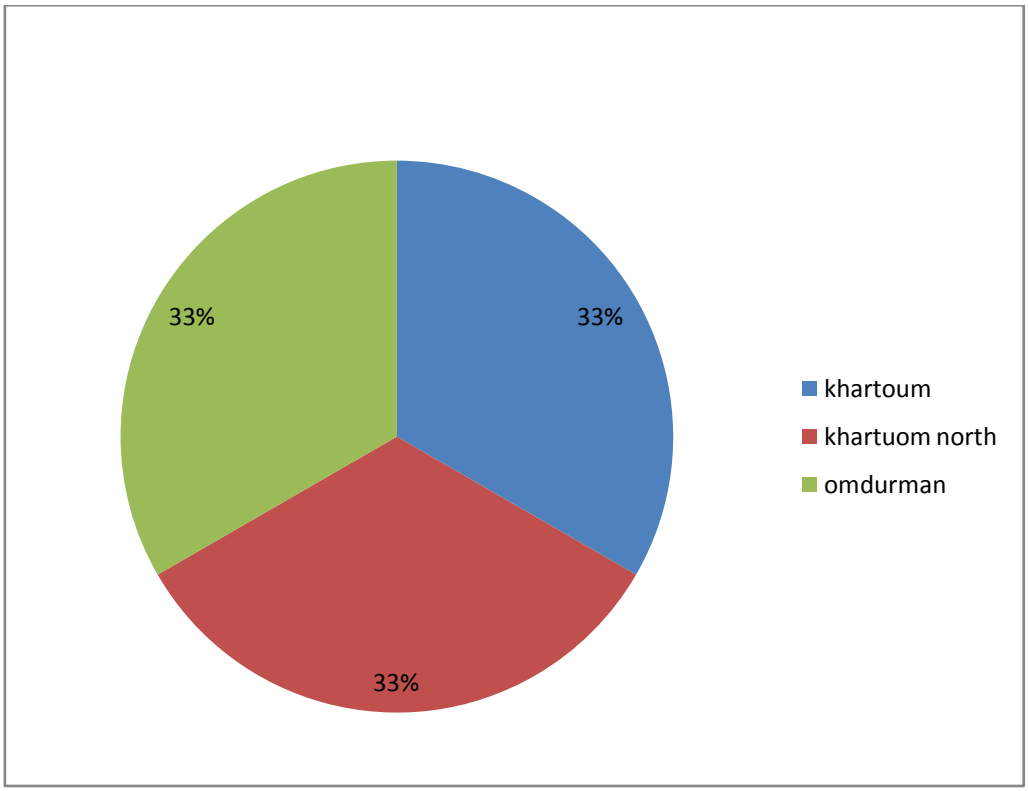

Fig (1): Distribution of study respondents according to the area (%).

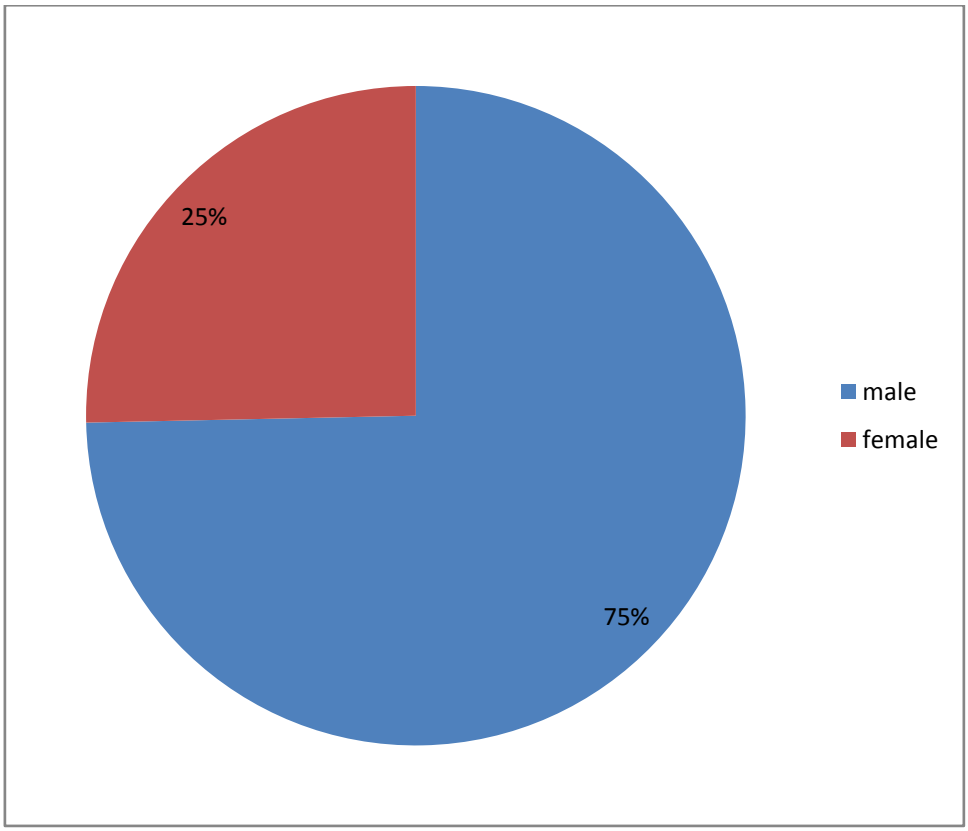

Figure (2) distribution of study respondents according to gender (%)

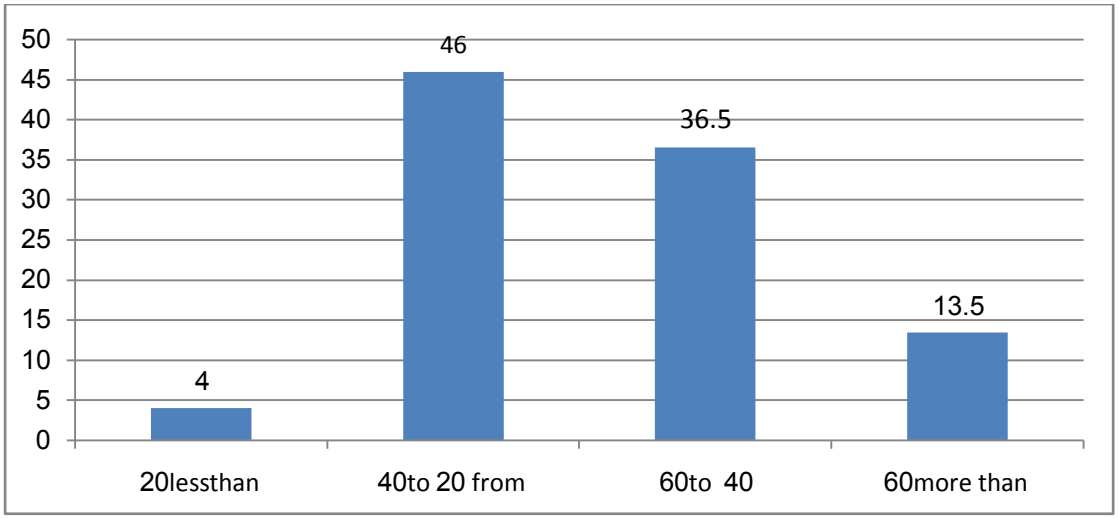

Figure 3 distributions of respondents according to their age.

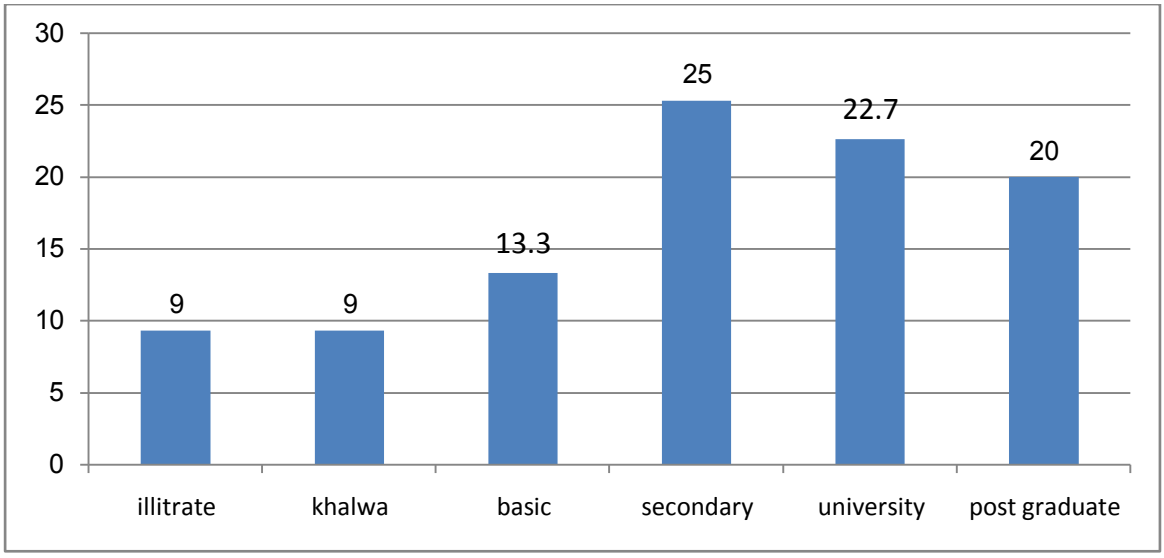

Figure 4 distributions of respondents according to their educational level.

Table (1) Distribution of respondents according to their occupation. (n=75)

Occupation	Frequency	Percent
House wife	8	10.7%
Labour	12	16.0%
Students	9	12.0%
Employee	19	25.3%
Others	27	36.0%
Total	75	100.0

Table (2) List of major diseases treated by camel's milk

Diseases	Frequency	Percent
Problem of digestive system	26	34.7
Diabetes	11	14.7
Blood pressures	2	2.7
Sexual impotence	8	10.7
Malnutrition	7	9.3
Rheumatoid	5	6.7
Cancer	5	6.7
Other	11	14.7
Total	75	100.0

Table (3) Source of information about therapeutic effect of camel milk

Source of information	Frequency	Percent
Text books and magazine	16	21.3
Family	18	24.0
Radio and T.V	3	4.0
Friends	11	14.7
Nutrition centre	5	6.7
Internets	5	6.7
Camels owners	17	22.7
Total	75	100.0

Table(4) Dose quantity intake/Lb/day

Dose/Lb/day	Frequency	Percent
0.5 to 1	34	45.3
1 to 2	30	40.0
more than tow	4	5.3
non defined	7	9.3
Total	75	100.0

Table(5) Time of dose intake

Time	Frequency	Percent
Morning	23	30.7
Evening	8	10.7
Night	6	8.0
Morning and Night	38	50.7
Total	75	100.0

Table (6) Duration of time associated with treatment by camel milk

Duration	Frequency	Percent
Less than one month	5	6.7
1 month to 12 month	23	30.7
24 month to 36 month	10	13.3
36 to 48	4	5.3
Above 60 month	33	44.0
Total	75	100.0

Table (7) Method of camel milk consumption for treatment

Milk consumption	Frequency	Percent
Raw	47	62.7
Gariss	12	16.0
Both 1 and 2	14	18.7
Processed	2	2.7
Total	75	100.0

Table (8) Use of additives to camel milk before consumption

Additive	Frequency	Percent
Addition	20	27.0
No addition	55	73.0
Total	75	100.0

Table (9) Types of additives used with camel milk

Additive type	Frequency	Percent
Camel urine	6	8.0
Sugar	3	4.0
Honey	3	4.0
Tea	3	4.0
Garlic or onion	3	4.0
Others (Hilba and Harjal)	2	2.7
No additive	55	73.3
Total	75	100.0

Table (10) Directions associated with consumption

Directions with consumption	Frequency	Percent
Not boiling the milk	14	18.7
Adding camel urine	4	5.3
Drink early morning	9	12.0
Raw and strained	16	21.3
None	32	42.7
Total	75	100.0

Table (11) Health improvement after utilization

Cause	Frequency	Percent
Yes Improvement	73	97.3
Non improvement	2	2.7
Total	75	100.0

Table (12) Knowledge of camel milk properties

Type of knowledge	Frequency	Percent
Know	61	81.3
Don't know	14	18.7
Total	75	100.0

Table (13) Use of camel milk according to breed, pasture and age

Type of using	Frequency	Percent
According	13	17.3
Not according	62	82.7
Total	75	100.0

Table (14) Source of camel milk

Source of camel milk	Frequency	Percent
Farm	39	52.0
Market	36	48.0
Total	75	100.0

Table (15) Price/pound

Price/SD/Pound	Frequency	Percent
5	5	6.7
6 to 7	36	48.0
8 to 9	23	30.7
Zero	11	14.7
Total	75	100.0

Table (16) Compared to other drugs

Comparison	Frequency	Percent
Yes cheaper	73	97.3
No expensive	2	2.7
Total	75	100.0

Table (17) Availability of camel milk in all seasons

	Frequency	Percent
Available	37.5	50.0
Not available	37.5	50.0
Total	75	100.0

4.2 Discussion

Fig. (1) Shows the distribution of respondents of Khartoum state according their areas (Khartoum, Khartoum North, and Omdurman) with an average % of 33.3 per each area.

Fig. (2) Shows that 74.7% of the participants were males and 23.3% females.

Fig. (3) Gives the age of the participants. The age of 45.9% of them ranges between 20-40 years, 36.5% between 40-60years, 13.5% above 60years and 4. % less than 20 years.

Fig.(4) Shows the educational level of the participants.25.% attended secondary school, 22.7% had university degree, 20% were post graduates and 13.3% basic school and 9.% for both attended khalwa or illiterate.

Table (1) shows the distribution of the questioned participants according to their occupation and jobs; 25.% were employees, 16.0% labor, 12.0% students and 10.7% house wife. The majority 36% had different occupation and jobs .It was noticed that all respondents agreed that camel milk can be consumed as therapeutic for specific diseases and this consumption is not linked with gender, age, occupation or educational level.

Table (2) shows the list of major diseases treated by camel milk consumers. One of the major diseases according to respondents (34.7%) was problems of the digestive system. This may be related to the possibility of camel milk to clean the digestive tract (Jabeer, 1420) and (ALTayeb and Elamin, 2007).Furthermore, camel milk has a bacteriostatic effect against pathogenic strains of certain bacteria (Benkerraum et.al.2004). 14.7% of consumers mentioned the use of

camel milk for the treatment of diabetes, and this was attributed to one protein of camel milk, which has many characteristics similar to insulin (AL-Ani, 2004). The probability that camel milk contain insulin-like small molecule substances that mimic insulin interaction with receptor, was previously mentioned by Ajmaladdin et.al.(2012).The utilization of camel milk for curing diabetes was recorded by many authors. (Agrawel et.al. 2005); (AL-Ani, 2004); (Khalifa, 2007).Other diseases that may be treated by camel milk including: dropsy, jaundice, problem of spleen, tuberculosis, asthmas, stress, chronic hepatitis and peptic ulcer, were recorded by 14.7% of the questionnaire consumers. This comes agreement with that given by Knoess(1982), Yagil(1982), Wernery(2003) and ELTaybeb and ELAmin(2007). 10.7% of the respondents explained that camel milk may be used as thearapy for sexual impotence, which was line with that indicated by Rao et.al (1970) and ALAni(2004). Based on the different nutrient elements that composes camel milk 9.3% of the respondents indicated that camel milk was very effective against malnutrition, (Murad, 2004), (Khanana, 1999) and 6.7% reported that camel milk is anti carcinogenic, which was similar to that given by Magieed(2005). Rheumatoid and blood pressure were also mentioned by 6.7% and 2.7% of the summers respectively.

The source of information about the therapeutic effect of camel milk for the consumers was obtained mainly from members of family (24.0%), camels owners (22.7%), followed by book and magazines (21.3%) and friends (14.7%). Other sources were nutrition center, internet, T.V. and radio. (See table, 3).

The dose quantity intake by consumers during the treatment varies a lot (Table, 4). The majority of them (45.3%) used to take 0.5-1 pound camel milk daily, followed by (40.0%) with intake of 1-2pounds, 5.3% used to

take more than 2 doses, while9.3% gave no definite dose quantity intake. The time for the dose intake by (50.7%) of the consumer during morning and night, (30.7%),(10.7%) and (8.0%) at morning, evening and nights respectively.

Table(6) Shows the duration, when consumers and how long camel milk was used as a therapy by them.(44.0%) used camel milk for more than 60 months ,(30.7%) for 1-12 months, (13.3%) for 24-36 months, (6.7%) for less than 1 month and (5.3%) for 36-48 months.

As given in table (7), (62.7%) prefer to consume fresh camel milk, others (18.7%) both fresh and fermented, while (16.0%) fermented and (2.7%) processed. It was noticed that consuming fresh camel milk dominated.

This agreed with that noticed by Eisa and Mustafa (2011), ELtaybe and ELamin (2007) and AL-Ani(2004).

Table (8) and (9) indicate the use (with or without) and types of additives to camel, when taken as a cure. (73%) used with no additives and (27%) with additives. The most common additive mixed with camel milk was camel urine, sugar, honey, tea, garlic and onions.

Certain directions concerning camel milk, when used for thearaptic purpose were advised. As shown in table (10), (21.3%) advised milk should be fresh and strained, (18.7%) not boiled, (12.0%) consumption early morning, and (5.3%) with added camel urine. However (42.7%) of the questioned consumers gave no comments about any directions in concern.

Table (11). Shows that the health of (97.3%) of the consumers has improved after utilizing camel milk as cure, while (2.7%) gave no definite answer.

The knowledge of medical and nutritive values and properties of came milk seems to be well known to (81.3%) of the consumers. (18.7%) were not informed about that as given in table (12).

Table (13) shows that (82.7%) of the respondents use camel milk regardless of the type of breed, age, of the she-camel and pasture. Only (17.3%) considered these factors,since they were indirect contact with camel farming.

Table (14) shows the source of camel milk that to be used as therapy. (52.0%) of the consumers received the milk from camel farms and (48%) directly from market. The price of one Lb camel milk also varies.

As given in table (15),(48.%) of the consumers paid 6-7 Sudanese pounds for 1Lmilk, (30.7%) paid 8-9 pounds, (14.7%) free and (6.7%) paid only 5 pounds. Compared to the prices of other medical drugs, camel milk is cheaper as given by (97.3%) of questioned participants (table 16).

The availability of camel milk for consumers during all seasons of the year is not stable, since (50%) of them had accesses to milk all the year, others (50%) claimed shortage in the availability (table 17).

Based on the results obtained, camel milk proved to have therapeutic effects against several diseases. This may lead to increasing consumption of camel milk as a cure in Khartoum State, beside the higher costs linked with the ordinary medical treatments.

5. Conclusion and Recommendations

5.1 Conclusion

Camel milk had been used for decades in some parts of the world as cure for diseases. The current research studies the possibilities, ways and methods of utilizing camel milk for such purpose in Khartoum State. Using camel milk as therapeutic was known by the different socio-economic groups as well as the diseases involved. Although there were variations in quantities of dose to be used and methods of application, are mark able health improvement was recorded by the consumers, Also, the cost of treatment when using camel milk was to a reasonable extent minimized. Therefore, it is of vital importance to pay more attention to the advantages and benefits expected from camel and it is products.

5.2 Recommendations

1-Study the possibilities of utilization of camel in hospital as diet therapy.

2-- Stimulation of awareness of camel milk consumption and their medical importance through mass media.

3- Further studies should be performed about the importance of camel's milk and their uses as therapy.

4-Establishment of irrigated camel farms around big cities to raise the productivity and make use of animal products for different purposes.

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بسم الله الرحمن الرحيم

استبيان عن : استخدام لبن الابل لعلاج الامراض في ولاية الخرطوم
(المستهلكين)

المعلومات الشخصية :-

1/ المنطقة السكنية :

ا-الخرطوم ☐ ب-الخرطوم بحري ☐ ج- ام درمان ☐

2/الجنس :

ا-ذكر ☐ ب- انثي ☐

3 / العمر :

.....

4/ المستوي التعليمي :

ا-امي ☐ ب -خلوة ☐ ج - اساس ☐ د-ثانوي ☐

و-جامعي ☐ ز- فوق الجامعي ☐

5/المهنة :

ا-ربة منزل ☐ ب- عامل ☐ ج-طالب ☐ د-موظف ☐

و- اخري . ☐

الاستخدامات :-

6/ما اسم المرض الذي تود علاجه ؟

.....

7/من اين تعرفت/سمعت بمعلومة(لبن الابل يستخدم كعلاج)؟

.....

8/ما مقدار الجرعة ؟

.....

9/ماهو توقيت تناول الجرعة .....

10/ هل تكرر الجرعة

ا–صباحا ☐ ب–مساء ☐ ج– ليلا ☐

11/منذ متي تستخدم اللبن كعلاج ؟.....

.....

12/ هل تستخدم لبن الإبل :

ا–طازج ☐ ب–قارص ☐ ج–مصنع ☐

13/هل تتم اضافة مدخلات اخري قبل استخدام اللبن ؟

ا– نعم ☐ ب– لا ☐

14/اذا كانت الاجابة بنعم اذكر الاضافة.

.....

15/–هل هناك ارشادات معينة مرتبطة بالاستخدام

.....

.....

.....

16/هل هناك تحسن صحي بعد استخدام اللبن ؟

.....

17/هل تعرف مواصفات لبن الابل ؟

ا/ نعم ☐ ب–لا ☐

18/ هل استخدامك للبن مرتبط بسلالالة ابل معينة اومرعي معين اوعمر معين ؟

ا–نعم ☐ ب–لا ☐

19 /اذا كانت الاجابة بنعم اذكر اسم السلالالة والعمر ونوعية الغذاء المقدم للابل؟

ا/ اسم السلالة ..... ب/ العمر ..... ج/ نوعية الغذاء المقدم .....

المحور الاقتصادي :-

20/من اين تحصل علي لبن الابل دائما

ا-المزرعة ☐ ب- المحل التجاري ☐

21/ كم سعر الرطل ؟

.....

22/هل هو ارخص مقارنة بالعلاجات الاخرى ؟ ا/ نعم ☐ ب/ لا ☐

23/هل اللبن متوفر في كل المواسم ؟ ا/ نعم ☐ ب/ لا ☐