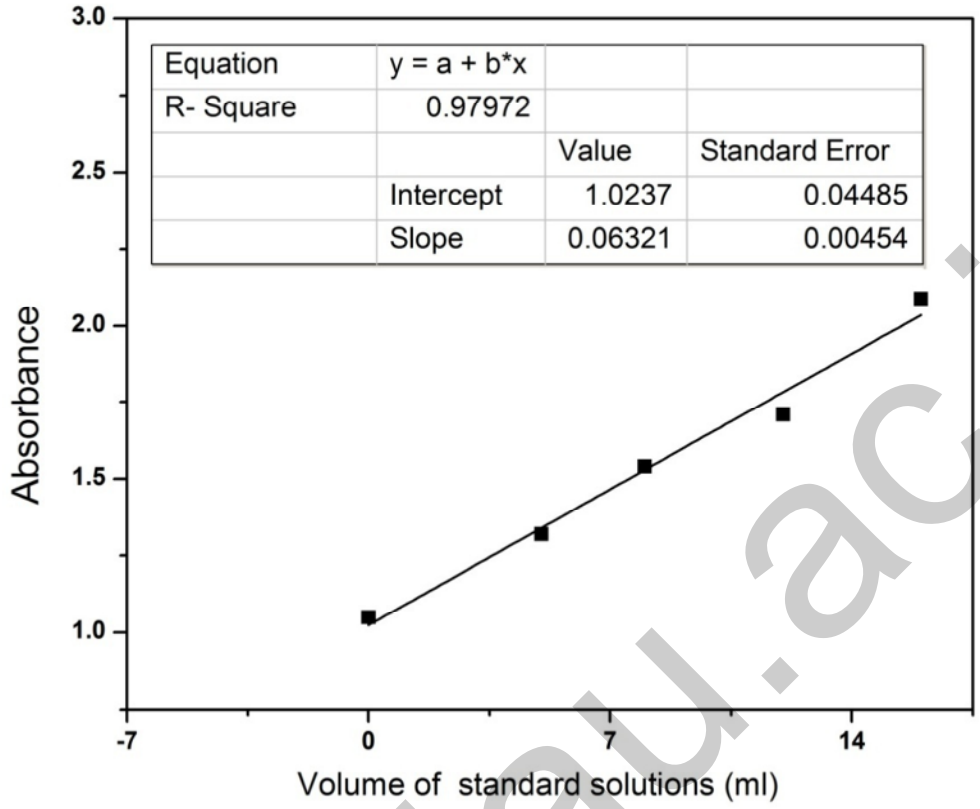

Fig. 5. Calibration plot for SAM (first time)

Table 3. Concentration of insulin in camel milk using both Direct Spectroscopy and SAM.

Methods	1th time (IU /l)	2nd time (IU /l)	3rd time (IU /l)	4th time (IU/l)	5th time (IU/l)	Average concentration(IU/l)
Direct Spectroscopy	18.78	18.4	18.41	18.35	19.30	18.65 ± 0.38
Standard Addition method	18.39	17.98	17.33	18.20	17.65	17.91 ± 0.40

SAM was also repeated five times and the results are listed in Table 3.

The insulin level in camel milk was determined 17.91± 0.40 and 18.65 ± 0.38 units/ liter using SAM and direct spectroscopy, respectively. In other reports, the insulin content in camel milk has been reported in the range of 45 – 125 units per liter using RIA kit (Zagoriski *et al*., 1998). The difference may not be due to the applied method because we used standard insulin solution in direct spectroscopy and this method was also used for the determination of insulin in aqueous solution by Pourhosseini *et al*. (Pourhosseini *et al*., 2007). In addition, we used SAM to reduce the matrix error in camel milk. However this difference between our results and other reports might be due to diverse condition of feeding and living environment for animals.

Both direct spectroscopy and SAM can be used to determine the insulin concentration in camel milk, however SAM is the method employed to reduce the error produced by sample matrix. Therefore standard addition method is a reliable method to determine the insulin concentration in camel milk.

Conclusion

UV-Vis Spectroscopy, based on Beer-Lambert law is a simple method for rapid determination of insulin. λ_{max} at 276 nm was used to determine insulin concentration in camel milk due to reducing deviation from Beer-Lambert law. The λ_{max} at about 276 nm indicated the existance of insulin in camel milk.

In the present study two methods based on absorption in UV-Vis spectroscopy including direct spectroscopy and SAM were used to determine insulin concentration in camel milk. There were not significant differences between the results obtained from these two methods.

In conclusion, the direct spectroscopy and SAM are simple, fast, inexpensive and reliable methods to determine the insulin concentration in camel milk, but SAM might be regarded more reliable due to the decreasing matrix error during insulin measurement. Therefore standard addition method (SAM) might be recommended to be used for measuring the concentration of insulin in camel milk.

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