Chapter 4

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4.1.0. Phytochemistry

4.1.1. Qualitative phytochemical Analysis of *Cajanus cajan* L.

The results of the qualitative analysis are presented in Table-01. The results of present investigations on the leaves, seeds and stems of *Cajanus cajan* L. are as follows: Tannins were present in the ethanolic, methanolic, chloroform and petroleum ether extracts of leaves, seeds and stem, whereas the chloroform extract of leaves and seeds and petroleum ether extract of seeds showed negative results; Saponins were absent in chloroform extract of leaves and petroleum ether extract of seeds; Reducing sugars were present in all the four extracts of leaves, seeds and stem of *Cajanus cajan*; except the ethanol and methanol extract of seeds and petroleum ether extract of leaves and stems; Alkaloids were absent only in chloroform extract of leaves; Terpenoids were absent in the ethanolic extract of seeds, methanolic extracts of seeds and methanolic, chloroform and petroleum ether extracts of leaves; cardiac glycoside were absent in ethanolic, methanolic and chloroform extracts of seed and chloroform and petroleum ether extracts of leaves; Anthraquinones were absent in all the four extracts of leaves, while the ethanolic and methanolic extracts of seeds and chloroform extract of stem of *Cajanus cajan* L. Flavonoids and phenols were present in all extracts of the plant. In leaves maximum phytochemicals remained on ethanolic extract; In seeds maximum phytochemicals remained on chloroform extract and in stems maximum phytochemicals remained on ethanolic and methanolic extract.

4.1.2. Qualitative phytochemical Analysis of *Carica papaya* L.

The results of the qualitative analysis of *Carica papaya* L. are presented in Table-02. The results gained from qualitative analysis of *Carica papaya* L. are as follows: Tannins were present in the ethanolic, methanolic, chloroform and petroleum ether extracts of leaves and stem, whereas the seeds showed positive results in ethanolic and methanolic extracts. The other two extracts- chloroform
and petroleum showed negative results; Saponins and reducing sugars were present in all the four extracts of leaves, seeds and stem of *Carica papaya* L.; except reducing sugar on the chloroform and petroleum ether extracts of seeds. Alkaloids were absent in chloroform and petroleum ether extract of seeds; Terpenoids were absent in the methanolic extracts of leaves and seeds; Cardiac glycoside were absent in methanolic extracts of stem and petroleum ether extracts of leaves; Anthraquinones were present in all extracts of *Carica papaya* L. In leaves maximum phytochemicals remained on Ethanolic and methanolic extract; Seeds maximum phytochemicals remained on ethanolic extract; Stems maximum phytochemicals remained on methanolic, chloroform and petroleum ether extract.

4.1.3. Quantitative phytochemical Analysis of *Cajanus cajan* L.

The results of the quantitative analysis are presented in Table-3. The results of the quantitative analysis of *Cajanus cajan* L. are as follows:

In *Cajanus cajan* L. leaves the secondary metabolites were found to be phenol 16.61%; tannins 0.49%; alkaloids, 2.65, %; flavonoids 4.77% and saponins 5.97%; Seeds phenol 3.82%; tannins 0.23%; alkaloids 2.65%; flavonoids 2.11% and saponins 6.23%; Stems: phenol 14.19%; tannins 0.22%; alkaloid 2.51%; flavonoids 5.44% and saponins 4.98%.

Quantitative phytochemical estimation of phenols was performed using Folin-Ciocalteu reagent. Gallic acid was used as standard compound and were expressed as mg/g gallic acid equivalent using the standard curve equation $y = 0.0061x + 0.0396$, $R^2 =0.9991$, where $y$ is absorbance at 760 nm and $x$ is total phenolic content in different parts of the plants. Standard curve for phenol is shown in Fig. 1. Absorbance of the standard compound, gallic acid was represented in Table 4. Maximum phenolic content was found in leaves (166.16 0.23 mg/g) than stems (141.93 0.36 mg/g) and seeds (38.26 1.53 mg/g). Total
phenolic contents in different parts of hydro-alcoholic extracts of *Cajanus cajan* L. were presented in Table 5.

For determining tannin standard procedure was followed by using Folin–Denis method, the tannin concentration was determined by the standard graph of tannic acid solution and were expressed as mg/g tannic acid equivalent using standard curve equation $y = 0.027x + 0.036$, $R^2 = 0.998$, where $y$ is absorbance at 700 nm and $x$ is tannin content. Standard curve for tannin is shown in Fig. 2. Graphical representation of percentage composition of phytochemicals found in leaves, seeds and stem of *Cajanus cajan* L. is presented in Fig. 3. Graphical representation of percentage composition with standard error bars of phytochemicals found in leaves, seeds and stem of *Cajanus cajan* L. is presented on Fig. 4. Graphical representation of percentage composition of phytochemicals found in leaves, seeds and stems of *Cajanus cajan* L. is shown separately in Fig. 5-7. Graphical representation of percentage composition of alkaloid, phenol, flavonoid, saponin and tannins found in leaves, seeds and stems of *Cajanus cajan* L. is presented in Fig. 8.

### 4.1.4. Quantitative phytochemical Analysis of *Carica papaya* L.

The results of the quantitative analysis are given in Table 6. The results of the quantitative analysis of *Carica papaya* L. are as follows: In *Carica papaya* L. leaves the secondary metabolites were found to be phenol 13.42%; tannins 0.17%; alkaloids 2.99%; flavonoids 5.08% and saponins 7.41%. Seeds: phenol 12.11%; tannins 0.12%; alkaloids 6.96%; flavonoids 3.38% and saponins 4.84%; Stem: phenol 4.78%; tannins 0.04%; alkaloid 1.5%; flavonoids 2.88% and saponins 2.85%.

Maximum phenolic content was found in leaves (134.2 3.36 mg/g) than seeds (121.04 1.02 mg/g) and stems (47.82 2.46 mg/g). Total phenolic contents in different parts of hydro-alcoholic extracts of *Carica papaya* L. were presented on Table 7. Graphical representation of percentage composition of phytochemicals
found in leaves, seeds and stem of *Carica papaya* L. is presented in Fig. 9. Graphical representation of percentage composition with standard error bars of phytochemicals found in leaves, seeds and stem of *Carica papaya* L. is presented in Fig. 10. Graphical representation of percentage composition of phytochemicals found in leaves, seeds and stems of *Carica papaya* L. were shown separately on (Fig. 11-13). Graphical representation of percentage composition of alkaloid, phenol, flavonoid, saponin and tannins found in leaves, seeds and stems of *Carica papaya* L. is presented on (Fig. 14).

### 4.2.0. Thin Layer Chromatography (TLC)

**4.2.1. Thin Layer Chromatography of Cajanus cajan L.**

TLC profiles of *Cajanus cajan* L. leaves are shown in Fig. 15. Number of spots and R\(_f\) values with their detecting reagents were indicated by A=Ethanol extract (Table-8); B=Methanol extract Table-9; C=Chloroform extract (Table-10); D=Petroleum ether extract (Table-11). Thin layer chromatography profile of the leaves, seeds and stem of *Cajanus cajan* L. in the solvents of ethanol, methanol, chloroform and petroleum ether extracts was accomplished in mobile phase of petroleum ether: benzene: methanol (16:3:2). R\(_f\) values and phytochemicals detected were as follows: TLC of *Cajanus cajan* L. leaves ethanol extract showed maximum 7 bands with R\(_f\) values and phytochemicals in the range of 0.07 to 0.99 (0.07 Saponins; 0.16 Flavonoid; 0.51 Flavonoid; 0.78 Flavonoid; 0.84 Phenol; 0.95 Phenol; 0.99 Alkaloid). Methanol extract showed maximum 6 bands with R\(_f\) values and phytochemicals in the range of 0.10 to 0.99 (0.10 Cardiac glycosides; 0.18 Saponins; 0.22 Flavonoid; 0.40 Flavonoid; 0.82 Phenol; 0.99 Alkaloid). Chloroform extract showed maximum 3 bands with R\(_f\) values and phytochemicals in the range of 0.95 to 0.99 (0.95 Phenol; 0.97 Flavonoid; 0.99 Phenol). Petroleum ether extract showed maximum 4 bands with R\(_f\) values and phytochemicals in the range of 0.18 to 0.94 (0.18 Saponins; 0.34 Phenol; 0.62 Phenol; 0.94 Alkaloid).
TLC profiles of *Cajanus cajan* L. seeds are shown in (Fig. 16). Number of spots and \( R_f \) values with their detecting reagents are indicated by A=Ethanol extract (Table-12); B=Methanol extract (Table-13); C=Chloroform extract (Table-14); D= Petroleum ether extract (Table-15). TLC of *Cajanus cajan* L. seeds ethanol extract showed maximum 3 bands with \( R_f \) values and phytochemicals in the range of 0.15 to 0.99 (0.15 Flavonoid; 0.93 Flavonoid; 0.99 Alkaloid). Methanol extract showed maximum 3 bands with \( R_f \) values and phytochemicals in the range of 0.05 to 0.10 (0.05 Saponins; 0.08 Flavonoid; 0.10 Flavonoid). Chloroform extract showed maximum 6 bands with \( R_f \) values and phytochemicals in the range of 0.06 to 0.83 (0.06 Saponins; 0.11 Phenol; 0.15 Flavonoid; 0.19 Flavonoid; 0.29 Anthraquinone; 0.83 Alkaloid). Petroleum ether extract showed maximum 2 bands with \( R_f \) values and phytochemicals in the range of 0.53 to 0.99 (0.53 Flavonoid and 0.99 Alkaloid).

TLC profiles of *Cajanus cajan* L. stem is shown in (Fig. 17). Number of spots and \( R_f \) values with their detecting reagents are indicated by A=Ethanol extract (Table-16); B=Methanol extract (Table-17); C=Chloroform extract (Table-18); D= Petroleum ether extract (Table-19). TLC of *Cajanus cajan* L. stems ethanol extract showed maximum 4 bands with \( R_f \) values and phytochemicals in the range of 0.12 to 0.99 (0.12 Flavonoid; 0.42 Flavonoid; 0.53 Flavonoid; 0.99 Alkaloid). Methanol extract showed maximum 6 bands with \( R_f \) values and phytochemicals in the range of 0.06 to 0.99 (Saponins; 0.21 Phenol; 0.33 Anthraquinones; 0.52 Phenols; 0.64 Flavonoids; 0.99 Alkaloids). Chloroform extract showed maximum 6 bands with \( R_f \) values and phytochemicals in the range of 0.09 to 0.97 (0.09 Saponins; 0.16 Phenol; 0.34 Phenol; 0.44 Phenol; 0.58 Flavonoid; 0.97 Alkaloid). Petroleum ether extract showed maximum 8 bands with \( R_f \) values and phytochemicals in the range of 0.29 to 0.98 (0.29 Cardiac glycoside; 0.34 Saponins; 0.36 Phenol; 0.47 Anthraquinone; 0.53 Phenol; 0.64 Flavonoid; 0.68 Anthraquinone; 0.98 Alkaloid).
4.2.2. Thin Layer Chromatography of *Carica papaya* L.

TLC profiles for *Carica papaya* L. leaves are shown in (Fig. 18). Number of spots and Rf values with their detecting reagents is indicated as A=Ethanol extract (Table-20); B=Methanol extract (Table-21); C=Chloroform extract (Table-22); D= Petroleum ether extract (Table-23). TLC of *Carica papaya* L. leaves ethanol extract showed maximum 5 bands with Rf values and phytochemicals in the range of 0.04 to 0.96 (0.04 Saponin; 0.09 Cardiac glycoside; 0.45 Phenol; 0.71 Flavonoid; 0.96 Alkaloid). Methanol extract showed maximum 5 bands with Rf values and phytochemicals in the range of 0.09 to 0.99 (0.09 Cardiac glycoside; 0.11 Saponin; 0.24 Flavonoid; 0.25 Flavonoid; 0.99 Alkaloid). Chloroform extract showed maximum 4 bands with Rf values and phytochemicals in the range of 0.83 to 0.92 (0.83 Phenol; 0.86 Flavonoid; 0.87 Saponin; 0.92 Phenol). Petroleum ether extract showed maximum 7 bands with Rf values and phytochemicals in the range of 0.08 to 0.99 (0.08 Phenol; 0.27 Phenol; 0.34 Phenol; 0.37 Flavonoid; 0.43 Flavonoid; 0.67 Phenol; 0.99 Alkaloid).

TLC profiles of *Carica papaya* L. seeds are shown in (Fig. 19). Number of spots and Rf values with their detecting reagents are indicated by A=Ethanol extract (Table-24); B=Methanol extract (Table-25); C=Chloroform extract (Table-26); D= Petroleum ether extract (Table-27). TLC of *Carica papaya* L. seeds ethanol extract showed maximum 2 bands with Rf values and phytochemicals in the range of 0.04 to 0.09 (0.04-Saponin and 0.09-Flavonoid). Methanol extract: It showed maximum 1 band with Rf value and phytochemical (0.10 Flavonoids). Chloroform extract: It showed maximum 2 bands with Rf values and phytochemicals in the range of 0.05 to 0.10 (0.05 Saponins and 0.10 Flavonoids). Petroleum ether extract: It showed maximum 1 band with Rf value and phytochemical 0.08 Saponins.

TLC profiles of *Carica papaya* L. stem is shown in (Fig. 20). Number of spots and Rf values with their detecting reagents are indicated by A=Ethanol extract (Table-28); B=Methanol extract (Table-29); C=Chloroform extract (Table-
D= Petroleum ether extract (Table-31). TLC of *Carica papaya* L. stems ethanol extract showed maximum 4 bands with $R_f$ values and phytochemicals in the range of 0.03 to 0.99 (0.03-Saponins; 0.22-Phenols; 0.25-Flavonoids; 0.99-Alkaloids). Methanol extract showed maximum 8 bands with $R_f$ values and phytochemicals in the range of 0.10 to 0.98 (0.10 Saponins; 0.13 Saponins; 0.26 Phenols; 0.43 Anthraquinones; 0.67 Flavonoids; 0.73 Flavonoids; 0.93 Flavonoids; 0.98 Alkaloids). Chloroform extract showed maximum 8 bands with $R_f$ values & phytochemical in the range of 0.07 to 0.99 (0.07 Saponins; 0.14 Cardiac glycosides; 0.20 Phenols; 0.29 Phenols; 0.46 Anthraquinones; 0.50 Anthraquinones; 0.57 Flavonoids; 0.72 Flavonoids; 0.99 Alkaloids). Petroleum ether extract showed maximum 6 bands with $R_f$ values and phytochemical in the range of 0.23 to 0.99 (0.23 Saponins; 0.47 Phenols; 0.58 Phenols; 0.63 Anthraquinones; 0.72 Flavonoids; 0.99 Alkaloids).

4.3.0. Proximate Assay

4.3.1. Proximate Analysis of *Cajanus cajan* L.
The results of the proximate composition are presented in (Table-32). Graphical representations of proximate analysis of the leaves, seeds and stem of *Cajanus cajan* L. is presented on (Fig. 21). Graphical representation of proximate analysis of leaves, seeds and stems of *Cajanus cajan* L. were shown separately on (Fig. 23-25). Graphical representations of the percentage dry matter, moisture, ash, fiber, fat, protein, carbohydrate and nutritive value of the leaves, seeds and stems of the *Cajanus cajan* L. were shown on (Fig. 26-27).

In *Cajanus cajan* L. leaves the proximate composition were found to be dry matter 93.68 ± 0.284; moisture 06.31 ± 0.284; ash 20.60 ± 0.114; fiber 21.82 ± 0.238; fat 13.00 ± 0.090; protein 31.99 ± 0.070; carbohydrate 6.269 ± 0.153 and nutritive value 236.72 ± 0.591. Seeds: dry matter 91.80 ± 0.229; moisture 8.20 ± 0.229; ash 22.11 ± 0.112; fiber 05.09 ± 0.086; fat 15.00 ± 0.090; protein 08.62 ± 0.035; carbohydrate 40.95 ± 0.244 and nutritive value 333.73 ± 1.500. Stems: dry
matter 93.88 ± 0.125; moisture 06.11 ± 0.125; ash 23.00 ± 0.222; fiber 27.70 ± 0.360; fat 14.19 ± 0.268; protein 21.34 ± 0.562; carbohydrate; 8.131 ± 0.389 and nutritive value 242.61 ± 1.569.

4.3.2. Proximate Analysis of *Carica papaya* L.

The results of the proximate composition are given in Table-33. Graphical representations of the proximate analysis of the leaves seeds and stem of *Carica papaya* L. is presented in Fig. 22. Graphical representation of proximate analysis of leaves, seeds and stems of *Carica papaya* were shown separately on (Fig. 28-30). Graphical representations of the percentage dry matter, moisture, ash, fiber, fat, protein, carbohydrate and nutritive value of the leaves, seeds and stems of the *Carica papaya* L. were shown in Fig. 31-32.

In *Carica papaya* L. leaves the proximate composition were found to be dry matter 92.8 ± 0.200; moisture 7.2 ± 0.100; ash 17.25 ± 0.010; fiber 9.00 ± 0.100; fat 13.50 ± 0.100; protein 12.39 ± 0.512; carbohydrate 40.66 ± 0.801 and nutritive value 333.36 ± 0.34. Seeds: dry matter 94.5 ± 0.200; moisture 5.50 ± 0.200; ash 18.0 ± 0.200; fiber 14.0 ± 0.200; fat 11.0 ± 0.100; protein 8.81 ± 0.035; carbohydrate 42.68 ± 0.087 and nutritive value 305.0 ± 1.30. Stem: dry matter 92.43 ± 0.208; moisture 7.50 ± 0.100; ash 13.25 ± 0.010, fiber 24.0 ± 0.100; fat 11.5 ± 0.100; protein 3.32 ± 0.047; carbohydrate 40.43 ± 0.135 and nutritive value 278.0 ± 0.535.

4.4.0. Antisickling Assay

4.4.1. Sickling Inhibitory Activity of *Cajanus cajan* L.

*Cajanus cajan* L.: The inhibitory activities found in increasing percentage in Leaves - 10.0:68.45; 5.0:62.48; 2.5:58.17; 2.0:49.43; 1.5:41.42; 1.0:36.79; 0.5:34.43; 0.1:30.93. Seeds- 2.0:70.82; 2.5:56.63; 1.5:54.79; 5.0:47.39; 1.0:41.42; 10.0:41.01; 0.5:35.19; 1.0: 29.2. Stems- 10.0: 65.18; 5.0: 62.61; 2.5: 59.41; 2.0: 52.41; 1.5: 45.1; 1.0:39.54; 0.5: 31.3; 0.1: 27.9. The inhibitory activities for different concentrations
of extracts revealed maximum inhibition activity (IA) of 68.45% in *Cajanuss cajan* L. leaves in a concentration of 10.0 mg/ml; seeds showed a IA of 70.82% in a concentration of 2.0 mg/ml; while the stems showed a IA of 65.18% in a concentration of 10.0 mg/ml. Comparison of percentage inhibition activity of *Cajanuss cajan* L. leaves, seeds and stem extract were presented in Table-34. One way ANOVA in Fig. 33-35 represents the difference in mean inhibition of sickle cell *in vitro* at difference concentration of the leaves, seeds and stem extracts of *Cajanuss cajan* L. Means (± SE) having similar alphabets are not statistically significant from each other at p < 0.05 (Based on Duncan’s multiple-range test). Compared graph of the difference in mean inhibition of sickle cell *in vitro* at difference concentration of the leaves, seeds and stem extracts of *Cajanuss cajan* L. were presented in Fig. 36. Bar and line graph represents the Inhibitory activity of the leaves, seeds and stem extract of *Cajanuss cajan* L. when compared with para-hydroxybenzoic acid (PHBA) [Positive control]. P<0.001 when compared with the control (PHBA) with the concentration of 0.1, 0.5, 1.0, 1.5, 2.0, 2.5, 5.0 and 10.0 mg/ml *in vitro*. Fig. 37-42. Compared Inhibitory activity of the leaves, seeds and stem extract of *Cajanuss cajan* L. were presented on (Fig. 43-44). Morphology of drepanocytes (Sickle cells) of the HbSS blood of untreated, treated with PBS (negative control), PHBA (positive control) and different concentration of the extracts of the leaves, seeds and stem extract of *Cajanuss cajan* L. were presented in Fig. 45-77.

4.4.2. Sickling Inhibitory Activity of *Carica papaya* L.

*Carica papaya* L.: The inhibitory activities found in increasing percentage in leaves- 1.0:71.80; 1.5:62.03; 2.0:58.20; 0.5:53.90; 2.5:48.23; 5.0:45.36; 10.0:39.37; 0.1: 38.46. Seeds- 2.5:68.50; 2.0:61.67; 1.5:57.41; 1.0:53.21; 0.5:44.54; 10.0:37.71; 0.1:34.45; 5.0: 44.44. Stems-10.0:68.33; 5.0:62.48; 2.5:58.16; 2.0:49.22; 1.5:41.82; 0.1: 41.82; 1.0:36.68; 0.5:34.21. The inhibitory activities for different concentrations of extracts revealed maximum inhibition activity (IA) of 71.80% in *Carica papaya* L. leaves in a concentration of 1.0 mg/ml; seeds showed a IA of 68.50% in a
concentration of 2.5 mg/ml; while the stems showed a IA of 68.33% in a concentration of 10.0 mg/ml. Comparison of percentage inhibition activity of *Carica papaya* L. leaves, seeds and stem extract were shown in Table-35. One way ANOVA in Fig. 78-80, represents the difference in mean inhibition of sickle cell *in vitro* at difference concentration of the leaves, seeds and stem extracts of *Carica papaya* L. Means (± SE) having similar alphabets are not statistically significant from each other at p < 0.05 (Based on Duncan’s multiple-range test). Compared graph of the difference in mean inhibition of sickle cell *in vitro* at difference concentration of the leaves, seeds and stem extracts of *Carica papaya* L. were presented in Fig. 81. Bar and line graph represents the Inhibitory activity of the leaves, seeds and stem extract of *Carica papaya* L. when compared with para-hydroxybenzoic acid (PHBA) [Positive control]. P<0.001 when compared with the control (PHBA) with the concentration of 0.1, 0.5, 1.0, 1.5, 2.0, 2.5, 5.0 and 10.0 mg/ml *in vitro* (Fig. 82-87). Compared inhibitory activity of the leaves, seeds and stem extract of *Carica papaya* L. were presented on (Fig. 88-89). Morphology of drepanocytes (Sickle cells) of the HbSS blood of untreated, treated with PBS (negative control), PHBA (positive control) and different concentration of the extracts of the leaves, seeds and stem extract of *Carica papaya* L. were presented in Fig. 90-122.

4.4.3. Reversal of Sickled Erythrocyte Activity of *Cajanus cajan* 

*Cajanus cajan* L.: The reversal activities found in increasing percentage in Leaves- 10.0:72.13; 5.0:67.98; 2.5:63.53; 2.0:54.05; 1.5: 47.42; 1.0:41.59; 0.5:39.62; 0.1:36.55. Seeds- 10.0:70.96; 5.0:61.46; 2.5:56.71; 2.0:51.03; 1.5:45.66; 1.0:39.24; 0.5:32.94; 0.1:30.06. Stems- 10.0:63.24; 5.0:57.72; 2.5:52.71; 2.0:46.26; 1.5:41.14; 1.0:35.41; 0.5:32.75; 0.1:27.22. The reversal of sickled erythrocyte for different concentrations of extracts revealed maximum reversal activity (RA) of 72.13% in *Cajanus cajan* L. leaves in a concentration of 10.0 mg/ml; seeds showed a RA of 70.96% in a concentration of 10.0 mg/ml; while the stems showed a RA of 63.24% in a concentration of 10.0 mg/ml. Comparison of percentage reversal activity of
Cajanus cajan L. leaves, seeds and stem extract were presented in Table-36. One way ANOVA (Fig. 123-125) represents the difference in mean reversal of sickle cell in vitro at difference concentration of the leaves, seeds and stem extracts of Cajanus cajan L. Means (± SE) having similar alphabets are not statistically significant from each other at p < 0.05 (Based on Duncan’s multiple-range test). Compared graph of the difference in mean reversal of sickle cell in vitro at difference concentration of the leaves, seeds and stem extracts of Cajanus cajan L. were presented in Fig. 126. Bar and line graph represents the reversal activity of the leaves, seeds and stem extract of Cajanus cajan L. when compared with para-hydroxybenzoic acid (PHBA) [Positive control]. P<0.001 when compared with the control (PHBA) with the concentration of 0.1, 0.5, 1.0, 1.5, 2.0, 2.5, 5.0 and 10.0 mg/ml in vitro. (Fig. 127-132). Compared reversal activity of the leaves, seeds and stem extract of Cajanus cajan L. were presented on (Fig. 133-134). Morphology of drepanocytes (Sickle cells) of the HbSS blood of untreated, treated with PBS (negative control), PHBA (positive control) and different concentration of the extracts of the leaves, seeds and stem extract of Cajanus cajan L. were presented in Fig. 135-167.

4.4.4. Reversal of Sickled Erythrocyte Activity of Carica papaya

Carica papaya L.: The reversal activities found in increasing percentage in Leaves- 10.0:72.43; 5.0:65.58; 2.5:63.37; 2.0:56.83; 1.5:50.20; 1.0:47.98; 0.5:40.54; 0.1: 37.62. Seeds- 10.0:65.96; 5.0:62.95; 2.5:56.92; 2.0:51.50; 1.5:45.18; 1.0:39.05; 0.5:34.73; 0.1:28.58. Stems- 10.0:62.97; 5.0:57.49; 2.5:48.39; 2.0:42.45; 1.5:38.36; 1.0:33.81; 0.5:29.47; 0.1: 23.47. The reversal of sickled erythrocyte for different concentrations of extracts revealed maximum reversal activity (RA) of 72.43% in Carica papaya L. leaves in a concentration of 10.0 mg/ml; seeds showed RA of 65.96% in a concentration of 10.0 mg/ml; while the stems showed RA of 62.97% in a concentration of 10.0 mg/ml. Comparison of percentage reversal activity of Carica papaya L. leaves, seeds and stem extract were made on (Table-37). One way ANOVA in Fig. 168-170, represents the difference in mean reversal of sickle
cell *in vitro* at difference concentration of the leaves, seeds and stem extracts of *Carica papaya* L. Means (± SE) having similar alphabets are not statistically significant from each other at p < 0.05 (Based on Duncan’s multiple-range test). Compared graph of the difference in mean reversal of sickle cell *in vitro* at difference concentration of the leaves, seeds and stem extracts of *Carica papaya* L. were presented in Fig. 171. Bar and line graph represents the reversal activity of the leaves, seeds and stem extract of *Carica papaya* L. when compared with Para-hydroxybenzoic acid (PHBA) [Positive Control]. P<0.001 when compared with the control (PHBA) with the concentration of 0.1, 0.5, 1.0, 1.5, 2.0, 2.5, 5.0 and 10.0 mg/ml *in vitro* Fig. 172-177. Compared reversal activity of the leaves, seeds and stem extract of *Carica papaya* L. were presented in Fig. 178-179. Morphology of drepanocytes (Sickle cells) of the HbSS blood of untreated, treated with PBS (negative control), PHBA (positive control) and different concentration of the extracts of the leaves, seeds and stem extract of *Carica papaya* L. were presented in Fig. 180-212.