Impact of Intake a Sidr (Zizyphus Spina-Christi L.) Extract on Enterobiasis Vermicularis Infection for Children

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Enterobiasis vermicularis (Ev), considered the most common helminthic infection in the world. Approximately 4% to 28% of children infected with Ev. Sidr (Zizyphus Spina-Christi) leaf has many therapeutic effects. The aim of the study promising anti-Ev agents by using Sidr extracts leaves. Choosing the Ev infected from 150 male children (7-10 yrs.), 5 children served as the normal control group and 25 children whose stool were infected with Ev. The data indicated the children treated with Sidr extracts at two levels (10 or 20 mg/day) where the (Pus cells & RBC's and Ova counts) in the stool decreased significantly from the first to the second week. After the continuation treat with Sidr, the Ev and Ova completely disappeared in the third week in dose 10 mg and second weeks of the dose 20 mg of Sidr. Furthermore, the children treated having improved significantly (P = 0.001) in (HB, RBC's, and WBC's) parameters.

Keywords: Children; Enterobiasis Vermicularis; Zizyphus Spina Christi.
treatment of Ev variety, e.g. Mebendazole, Pyrantel pamoate or Albendazole, are used, two weeks separated\textsuperscript{11}. These medicinal occurrences, many side effects, including headache, nausea, dizziness, metallic taste, and failures in treatment are frequently reported Sik et al.,\textsuperscript{12}. Additionally, the development of parasites resistant to common therapies features the requirement for new elective restorative approaches and the significance of natural treatment as a novel enemy of parasitic specialists. Numerous restorative plants indicated a guarantee in the treatment of Ev, with low side effects and high impact illustrated by Eleni et al.,\textsuperscript{13}.

Zizyphus Spina-Christi L. locally known as Sidr is a multipurpose tree species belonging to the botanical family Rhamnaceae. It is an important cultivated tree and one of the few truly native trees species in the Arabic area that is still growing to now\textsuperscript{14}. It contains flavonoids, alkaloids and, saponins are the main phytochemicals. The major components of the leaves’ volatile oil are geranyl acetone, methyl hexadecanoate, methyl octadecanoate, farnesyl acetone, hexadecimal, and ethyl octadecanoate. Sidr is one of the significant organic product crops in dry parts of tropical Asia and Africa\textsuperscript{14}. The organic product of sidr is profoundly nutritious and plentiful in vitamin C. The dry organic product (i.e., per 100 g) contains 314 calories, 0.9% fat, 4.8% protein, 80.6% complete sugar, 140 mg Ca, 3 mg Fe, 0.13 mg riboflavin, 0.04 mg thiamin, 3.7 mg niacin, and 30 mg ascorbic acid 15. The botanical extract of Sidr leaves contains four saponin glycosides: christanin A, christanin B, C and D. It was shown to contain beutic acid and kinetic acid, cyclopeptides, as well as flavonoids lipids, protein, free sugar and mucilage 16. The aim of our study: The impact of Sidr (Ziziphus Spina-Christi L.) leaf against the Ev in a sample of children as a natural treatment and compared with the effect of metronidazole drug.

**MATERIALS AND METHODS**

**Chemicals and Plant Extracts**

Dried Zizyphus Spina-Christi leaves (Sidr) were purchased from the agriculture organization market in Giza-Egypt. Sidr leaves were extracted according to the method described by Adzu et al.,\textsuperscript{17}. Preparation of water extract on the heat by collecting 10 g and/or 20 g of dry leaves powder of Sidr and put in a glass flask 500ml capacity contains 200 ml distilled hot water 100° C. Consequently, three layers of the coffee filter were nominated to separate the large plankton. Therefore, the final filtration was performed using a centrifuge for 15 minutes to separate the small plankton and obtain a clear solution. Then get a basic solution and complete the size to 100 ml of Sidr extract.

**Experimental Protocol and Subjects**

Planning the mothers’ meeting to invite him to participate in the study. Accordingly, all mothers attending the meeting approved to examine the stools of her children. Nevertheless, 40% of them did not approve the blooding examine. As well as, written informed consent was obtained from all the mothers and fathers who, her children will participate in this study. One hundred fifty of the children presented their stool samples. After examining it found about 25 subjected infected with Ev and/or Ova. Therefore, the total samples chosen were 30 children; males (7-10 yrs.) were carried out of three primary schools in Cairo, Egypt. The children were arranged into four groups. These presented in Fig. (1):

- Five children served as normal control (-ve) G1. As well as, 25 children who as follows:
  - G 2: Children infected with Ev + treatment with Sidr (10 mg/200 ml distill water.) /21 days (n = 10) according to Adzu et al., 17.
  - G 3: Children infected with Ev + treatment with Sidr (20 mg/200 ml distill water.) /14 days (n = 10).
  - G 4: Children infected with Ev + treatment with Mebendazole (MBZ) (100 mg/7 days) for 14 days (n = 5).

Stool samples collected to determine the infection (pus cells and RBC’s) by Ev before and after treatment, according to Wilson et al., 18. Red blood cells (RBC’s) count and white blood cells (WBC’s) were indicated by Linberg et al., 19. Hemoglobin (Hb) had decided by Hardison and Ross, 20.

**Statistical Analysis**

The results are reported as the mean ± SD of values obtained from multiple observations. Differences between means were considered statistically significant at P < 0.01 variance\textsuperscript{21}. 
All statistical analyses were computed by SPSS version 10.

**Ethical Approval**

The protocol was approved by the Ethics Committee for human studies of the Ain shams University of Cairo, Egypt, and by the private education management in Cairo.

**RESULTS**

Our data in Figure (2) have indicated that assessment of the stool’s analysis of children in four groups before treatment, the results showed that no pus cells and red blood cells (RBC’s) in the stool for group 1 as negative control. Concerning to the groups of children have infected with Ev, it was observed that pus cells were elevated significantly between groups G 2, G 3 and G 4 at \( p < 0.001 \) compared with control negative with a mean value of \( (4.0 \pm 0.2, 0.6 \pm 4.4 \text{ and } 0.4 \pm 4.2) \), respectively. Accordingly, the existence of RBC’s in the stool of children before treated was presented in Fig. (2). The data showed that there was a significant difference at \( p < 0.001 \) between infected groups compared with the group of healthy children. Moreover, the results of a table (1) illustrated the effect of the Sidr extract on stool analysis (Pus cells & RBC’s) of children infected with Ev after treated for three weeks. Therefore, it was observed that infected children (G 2) have treated with Sidr at level one (10mg/day) the (pus cells & RBC’s) in stool were decreased significantly at \( p < 0.001 \) gradually from the first to second weeks furthermore, disappeared in the third week compared between them and other groups.

Furthermore, the data in a table (1) indicated that the group of infected children in (G3) that having the treatment with Sidr at level two (20mg/day) in the first week and follow up three weeks, the results of (pus cells & RBC’s) in stools were decreased significantly at \( p < 0.001 \) and disappeared in the second and third weeks. The results of treating the infected children in (G 4) with MBZ drug represent in table 1 the data observed that (pus cells & RBC’s) in the stool were disappeared after the second week.

The comparison between the blood analyses of children Pre and after the treatment with Sidr extract is present in the table (2). Consequently, the results indicated that a decline significantly at \( p < 0.001 \) of Hb levels, RBC’s and WBC’s, count of children infected with Ev pre-

![Fig. 1. Showed the protocol of chosen samples and distribution groups and treatment](image-url)
treated (G2 G3 and G4) compared with the healthy children in group one. However, the parameters of blood (Hb, RBC’s, and WBC’s) were improved significantly after treatment. Accordingly, the best results of Hb, RBC’s and WBC’s in the group (3) treated with Sidr (at level 2 of 20 mg) with the mean value of (15.0±0.3 g/dL, 5.0±0.1 M/µL and 9.0±0.8 K/mm ), respectively compared with the same group before the treated and other groups. Besides all blood variables were risen and improved significantly in treating groups post-treatment compared with the same groups before treated.

The impact of Zizyphus Spina-Christi L. extracts on (Ev) – Ova infected children post-treatment for three weeks was presented in Table (3). Accordingly, the results illustrated that the Ova count disappeared significantly at (p < 0.001) completely in the third week for three groups (G 2: G 4). As well as, the data illustrated that the children treated with Sidr at (20 mg or MBZ 15 mg) the Ova significantly at (p < 0.001) disappeared totally in the second week compared with before treated.

**DISCUSSION**

Enterobius vermicularis (pinworm) is one of the most well-known human parasitic helminths, and It is widely prevalent among kids. Some behaviors and natural components in the environment may encourage pinworm disease. Our results indicated that from 150 children stools analyses were founded 25 (16.6%) of children infected with pinworms. These agree with Fan, et al.,22 reported that the overall prevalence of pinworms infection was 22.4% in samples. Girls (20.31%) had a lower prevalence than boys (24.5%) age range bigger than 5 years. Since individual cleanliness and exposure are significant transmission factors as poor personal or group hygiene, for example, kindergartners age, schools, orphanages, and family groupings 23 and 24. Ahamed et al.,25 identified Ev in a sample of children aged from (6 – 12) years in a rural area at Beheira, Egypt were found the 11.8% of specimens infected with Ova in stool. Our data represented that the children treated with Sidr extract at two levels (10 or 20 mg/day) were the (pus cells & RBC’s and Ova counts) in stool decreased significantly at (p <0.001) gradually from the first to the second week. After the continuous treat with Sidr extracts, the Ev and Ova completely disappeared in the third week in the dose, 10 mg of Sidr and the second week of the dose 20 mg of Sidr. Our illustrated explain that the efficacy of Sidr against Ev and Ova in children as similar results of the MBZ drug in group 4. Many of the studies reported the potential effect of Ziziphus against diarrhea26, antinociceptive17, anticarcinogenic27,
Table 1. Effect of Zizyphus Spina-Christi L. extracts on Stool analysis of children infected with Ev after treatment for three weeks

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatment doses (mg/ day)</th>
<th>Mean Pus Cells ± SD (First week)</th>
<th>Mean RBC’s (hpf) ± SD (First week)</th>
<th>Mean Pus Cells ± SD (second week)</th>
<th>Mean RBC’s (hpf) ± SD (second week)</th>
<th>Mean Pus Cells ± SD (third week)</th>
<th>Mean RBC’s (hpf) ± SD (third week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal control</td>
<td>Group 1</td>
<td>Non-infected</td>
<td>0.00 ± 0.00</td>
<td>0.00 ± 0.00</td>
<td>0.00 ± 0.00</td>
<td>0.00 ± 0.00</td>
<td>0.00 ± 0.00</td>
</tr>
<tr>
<td>Treated groups</td>
<td>Group 2</td>
<td>Sidr 10mg</td>
<td>1.2**±3.0</td>
<td>0.8**±2.0</td>
<td>1.01 ± 0.3**</td>
<td>1.4 ± 0.5**</td>
<td>0.00 ± 0.00**</td>
</tr>
<tr>
<td></td>
<td>Group 3</td>
<td>Sidr 20mg</td>
<td>0.9**±2.0</td>
<td>0.5**±1.0</td>
<td>0.00 ± 0.00**</td>
<td>0.00 ± 0.00**</td>
<td>0.00 ± 0.00**</td>
</tr>
<tr>
<td></td>
<td>Group 4</td>
<td>MBZ 15mg</td>
<td>1.1** ±2.7</td>
<td>0.7** ±1.5</td>
<td>0.00 ± 0.00**</td>
<td>0.00 ± 0.00**</td>
<td>0.00 ± 0.00**</td>
</tr>
</tbody>
</table>

P values represent the relationship between non-infected and treated groups for children. **Highly significant at \( P < 0.001 \)

Ev= Enterobiasis vermicularis

Table 2. The comparison between the blood analysis of children pre and post- treatment with Zizyphus Spina-Christi L. extracts

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatment doses (mgD day)</th>
<th>Pre-treatment Mean HB g/dL</th>
<th>Mean RBC’sM/µL</th>
<th>Mean WBCsK / mm</th>
<th>Post-treatment Mean HBg/dL</th>
<th>Mean RBC’S M/µL</th>
<th>Mean WBC’sK / mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal control</td>
<td>Group 1</td>
<td>Healthy</td>
<td>13.0 ± 0.1</td>
<td>4.3 ± 0.05</td>
<td>10.2 ± 0.4</td>
<td>13.1 ± 1.0</td>
<td>4.2 ± 0.2</td>
</tr>
<tr>
<td>Treated groups</td>
<td>Group 2</td>
<td>Sidr 10mg</td>
<td>11.0 **± 0.7</td>
<td>3.7** ± 0.23</td>
<td>7.0 **± 0.2</td>
<td>14.0 ± 2.0**</td>
<td>4.0 ± 0.3**</td>
</tr>
<tr>
<td></td>
<td>Group 3</td>
<td>Sidr 20mg</td>
<td>10.2** ± 0.5</td>
<td>3.4** ± 0.18</td>
<td>7.2** ± 0.4</td>
<td>15.0**± 0.3</td>
<td>5.0**± 0.1</td>
</tr>
<tr>
<td></td>
<td>Group 4</td>
<td>MBZ 15mg</td>
<td>10.5** ± 0.5</td>
<td>3.5** ± 0.16</td>
<td>7.3** ± 0.5</td>
<td>14.1**± 1.0</td>
<td>5.0**± 0.2</td>
</tr>
</tbody>
</table>

P values represent the relationship between group1 and other groups for children. **Highly significant at \( P < 0.001 \)
Table 3. The impact of Zizyphus Spina-Christi L. extracts on Enterobiasis vermicularis infected children post-treatment for three weeks

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatment doses (mg D day)</th>
<th>Pre intervention. Ova± SD</th>
<th>Post intervention. Mean Ova± SD (First week)</th>
<th>Post intervention. Mean Ova± SD (Second week)</th>
<th>Post intervention. Mean Ova± SD (Third week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal control</td>
<td>Group 1</td>
<td>Non-infected</td>
<td>No there</td>
<td>1.0 ± 1.0**</td>
<td>0.0 ± 0.0**</td>
</tr>
<tr>
<td>Treated groups</td>
<td>Group 2</td>
<td>Sidr 10mg</td>
<td>4.0±1.0**</td>
<td>1.0 ± 1.0**</td>
<td>0.0 ± 0.0**</td>
</tr>
<tr>
<td></td>
<td>Group 3</td>
<td>Sidr 20mg</td>
<td>4.0±2.0**</td>
<td>0.0 ± 0.0**</td>
<td>0.0 ± 0.0**</td>
</tr>
<tr>
<td></td>
<td>Group 4</td>
<td>MBZ 15mg</td>
<td>4.0±1.0**</td>
<td>0.0 ± 0.0**</td>
<td>0.0 ± 0.0**</td>
</tr>
</tbody>
</table>

P values represent the relationship between no-infected and treated groups for children.

**Highly significant at P < 0.001

Ev = Enterobiasis vermicularis
confirmed that Sidr improves RBC’s, and WBC’s levels in rats. As well as, the results agree with El-Desouky et al., who showed that 12.5 mg of aqueous extract of Sidr leaves for two weeks, increased significantly the RBC’s and WBC’s count and improve Hb in rats.

CONCLUSION

Finally, we can conclude that using the Zizyphus Spina-Christi L. extract considers the potential effect against Ev, Ova and the side effect of infection, children can be used for two weeks at dose 20 mg/kg or 10 mg/kg dose for three weeks.

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REFERENCES

15. Emtinan MM A. Chara Cterization and Biological Activity Study of Ziziphus Spina-Christi seed Oil. M.Sc in chemistry- Sudan University of Science and Technology, 2016; College of Graduate Studies.
16. Nazif, N.M. Phytoconstituents of Zizyphus Spina – Christi seed Oil. M.Sc in chemistry- Sudan University of Science and Technology, 2016; College of Graduate Studies.
25. Ahmed M. S. Bayoumy, Mohamed A. Abd El
24. Cook GC. Enterobius vermicularis infection.
23. Burkhart CN, Burkhart CG. Assessment of
27. Abdel-Wahhab MA, Omara EA, Abdel-Galil MM,
22. Fan, Chia-Kwung, Ting-Wu Chuang, Ying-Chieh
19. Linberg, R., Conover, C.D., Shum, K.L and
20. Hardison, A and Ross, C. Evolution of hemoglobin
35

21. Woolson, R. F., and Clarke, W. R. Estimation of
10.1186/s12879-019-4159-0.

19. Linberg, R., Conover, C.D., Shum, K.L and
20. Hardison, A and Ross, C. Evolution of hemoglobin


21. Woolson, R. F., and Clarke, W. R. Estimation of
frequency, transmission, and genitourinary
complications of enterobiasis (pinworms). Int J
Infectious Diseases. 2019; 85:101456.

22. Fan, Chia-Kwung, Ting-Wu Chuang, Ying-Chieh
Huang, Ai-Wen Yin, Chia-Mei Chou, Yu-Ting
Hsu, Ramson Kios, et al. Enterobius vermicularis
infection: prevalence and risk factors among
preschool children in kindergarten in the capital
area, Republic of the Marshall Islands. BMC

23. Burkhart CN, Burkhart CG. Assessment of
frequency, transmission, and genitourinary
complications of enterobiasis (pinworms). Int J

24. Cook GC. Enterobius vermicularis infection. Gut.;

25. Ahmed M. S. Bayoumy, Mohamed A. Abd El
Raheem, Anwar H. Abo Hashim, Ahmed S. K.
Al Saadawy, Islam M. R. Al Karyony. Parasitic
Profile among Primary School Children in A
Rural Area at Beheira Governorate, Egypt- The
Egyptian Journal of Hospital Medicine. 70(12),

Evaluation of the antidiarrheal effects of
Zizyphus Spina-Christi stem bark in rats. Acta

27. Abdel-Wahhab MA, Omara EA, Abdel-Galil MM,
Hassan NS, Nada SA, Saeed A, et al. Zizyphus
Spina-Christi extract protects against aflatoxin
B1-initiated hepatic carcinogenicity. African
Journal of Traditional, Complementary, and

altissima and Zizyphus Spina Christi on
bilharzial infestation in mice: histological and
histopathological Studies. J Appl Sci.; 6(7):1437-
46 (2006).

29. Adzu B & Haruna AK. Studies on the use of
Zizyphus Spina-Christi against pain in rats and
(2007).

Assessment of the antimicrobial potential of the
hydro-methanolic extract of Sdir (Ziziphus
Spina-Christi) plant against selected pathogens

31. Bassam F. AL-ZAIN. Impact of Socioeconomic
Conditions and Parasitic Infection on Hemoglobin
Level among Children in Um-Unnasser Village,

32. Ahmed Adil Ali, Qasim Sharhan Almayah,
Mohammed SabriAbdul Razzaq, and Mohammed
A.K.AL-Saadi . Impact of Enterobiasis on some
physical& hematological indices among children

33. Kadhim J.O. Epidemiological study of
Enterobiasis among pupils of some primary
school of Baquba District/Diyala. M.Sc
In Arabic (2007).

34. Mohammad A. K, and Omer M. A. Prevalence
of Enterobiasis Enterobiusvermicularis and its
Impact on Children in Kalar Town/Sulaimania-

35. Hama A. A. Intestinal parasites in relation to
malnutrition among primary school children in
Erbil province with evaluation of some anti-
Salahadin Univ. Erbil., 2007; P76.

36. Rabia Niamat, Mir Ajab Khan, Kiran Yasmin
Khan, Mushtaq Ahmad, Paras Mazari, Element
Content of Some Ethnomedicinal Ziziphus Linn.
Species Using Atomic Absorption Spectroscopy
Technique. Journal of Applied Pharmaceutical
Science 02(03), 2012: 96-100.

37. Marcelino Montiel-Herrera, Samuel Campista-
León, Irma L. Camacho-Hernández, Antelmo
Rios-Morgan & Francisco Delgado-Vargas.
Physicochemical and nutritional characteristics
of the fruit of Ziziphus mauritiana Lam.) Leaves
Extract as Radioprotector on Some Biochemical Parameters of ³-Irradiated Male Albino Rats. Journal of Advanced Research