Jurnal Kedokteran dan Kesehatan: Publikasi Ilmiah Fakultas Kedokteran Universitas Sriwijaya
Volume 12, No 3. 2025/DOI: 10.32539/JKK.V12i3.685
p-ISSN 2406-7431; e-ISSN 2614-0411
Page:307-312

SOIL TRANSMITTED HELMINTHS EGGS CONTAMINATION IN CABBAGES (Brassica oleracea var. capitata) FROM PALEMBANG'S TRADITIONAL MARKETS

Daffa Rafid Yunanda[1], Gita Dwi Prasasty[2*], Susilawati[2], Dwi Handayani[2], Dalilah[2]
[1]Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia
[2]Department of Parasitology, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia

ARTICLE INFO

Corresponding author:
Gita Dwi Prasasty
Department of Parasitology,
Faculty of Medicine,
Universitas Sriwijaya,
Palembang, Indonesia

Email:
gitadwiprasasty@fk.unsri.ac.id

Kata kunci:
Kubis
Lalapan
Soil Transmitted Helminths
Telur

Keywords:
Cabbage
Egg
Fresh vegetables
Soil Transmitted Helminths

Original submission:
May 21, 2025
Accepted:
June 15, 2025
Published:
September 20, 2025

ABSTRAK

Masyarakat Indonesia gemar mengonsumsi sejumlah sayur mentah, salah satunya kubis. Meskipun telah dicuci bersih, kubis mentah masih berisiko mengandung telur STH dan menularkan kecacingan. Penelitian yang bertujuan untuk mengetahui kontaminasi telur STH pada kubis mentah ini, menggunakan desain deskriptif observasional dengan pendekatan cross-sectional. Sebanyak 30 sampel kubis diambil secara acak dari 10 penjual di pasar tradisional. Sampel dianalisis menggunakan metode sedimentasi dan telur STH diidentifikasi melalui mikroskop. Seluruh sayur kubis di pasar diletakkan di atas meja, yang menunjukkan praktik kebersihan yang cukup baik. Meskipun demikian, sebanyak satu dari 30 sampel (3,33%) terkontaminasi telur Ascaris lumbricoides. Temuan ini menekankan pentingnya meningkatkan kebersihan sayuran dan kesadaran masyarakat mengenai konsumsi sayuran yang dimasak.

ABSTRACT

Soil Transmitted Helminths Egg Contamination in Cabbage (Brassica oleracea var. capitata) at Traditional Market, Palembang City. Indonesian people like to consume a number of raw vegetables, one of which is cabbage. Even though it has been washed clean, raw cabbage is still at risk of containing STH eggs and transmitting worms. This study aimed to determine STH egg contamination in raw cabbage, used a descriptive observational design with a cross-sectional approach. A total of 30 cabbage samples were taken randomly from 10 sellers at the traditional market. Samples were analyzed using the sedimentation method and STH eggs were identified under a microscope. All cabbage vegetables in the market were placed on the table, which indicates fairly good hygiene practices. However, one in 30 samples (3.33%) was contaminated with Ascaris lumbricoides eggs. These findings highlight the importance of improving vegetables hygiene and public awareness regarding cooked consumption.

INTRODUCTION

Soil transmitted helminths (STH) are a group of worms that can infect humans and are transmitted through soil media. This group of worms has infected more than 1.5 billion people worldwide. Southeast Asia has become the region with the highest number of cases on the Asian continent in recent decades.[1] Indonesia as a country in Southeast Asia with a tropical climate supports the development of STH with a prevalence reaching 28.12%.[2,3] Based on research conducted by Ramayanti in 2021, STH infection in SD Negeri 149, Gandus District, Palembang City reached a prevalence of 29.2%. Meanwhile, based on research conducted by Saskyarasmi in 2021,

The prevalence of STH infection in elementary school children around the Sukawinatan final disposal site at Palembang City reached 24.8%.[4]

The high number of STH infection cases is caused by several factors supporting the continuity of its life cycle, such as inadequate environmental sanitation, low public awareness of personal hygiene, and unfavorable socio-economic conditions.[5] Soil conditions are one of the environmental sanitation factors. Soil can be contaminated by STH eggs that are excreted together with human feces.[6] STH eggs can enter the human body through drinking water, direct contact with soil, mechanical vectors such as flies, or food products grown in the soil.[7]

Indonesian people like to consume several types of vegetables raw, one of which is cabbage.[8] Previous research showed that STH egg contamination was found in 26.9% of a total of 9 lettuces and 9 cabbages in the traditional market of Jambi City.[6] Research conducted at the Traditional Market and Modern Market of Medan City found STH egg contamination in 21 vegetables.[7] However, on the other hand, Widarti did not observe intestinal nematode eggs in 10 samples of cabbage.[9]

Palembang City has many traditional markets that sell various types of vegetables, one of which is the Kebon Semai Traditional Market. Cabbage that is widely sold in traditional markets is often consumed raw by the community and is susceptible to STH contamination. Therefore, it is important to identify STH egg contamination in cabbage at the Kebon Semai Traditional Market in Palembang City; that research has never been conducted before.

METHOD

This study aimed to identify STH contamination in cabbages sold at the Kebon Semai Traditional Market, Palembang City, with ethical approval number 219-2024 (Medical and Health Research Ethics Committee (KEPKK) of the Faculty of Medicine, Sriwijaya University, Indonesia). The exclusion criteria were rotten and wilted cabbages. The total sample of the study was 30 cabbages that were taken randomly from 10 cabbage sellers, with 3 cabbages from each seller. The placement of the cabbage was also recorded to determine the risk of contamination when placed directly on the ground. All cabbages were tested using the sedimentation method.[10] Each cabbage was soaked in 0.9% NaCl solution for 30 minutes. The soaking water was centrifuged at 1500 rpm, 5 minutes. The resulting sediment was divided into 2 to 3 object glasses by dropping 2 drops of sediment and 1 drop of 2% eosin. The preparation was observed under a microscope with 4x, 10x, and 40x magnification to detect the presence and morphology of STH eggs. The preparation and microscopic methods were validated by experts in medical laboratory technology. The results were recorded and processed to determine the level of contamination and the type of egg species found.

RESULTS

All samples were placed on ceramic tables (Table 1). No samples were placed directly on the ground or covered with tarpaulins and other bases.

Table 1. Distribution of cabbages placement.

Cabbages placement	Total	
	n	%
On the table	30	100%
Above the ground	0	0
Above the ground with a base	0	0
Total	30	100%

There was one cabbage with STH eggs that were successfully identified (3.33%) from a total of 30 cabbages tested (Table 2). Based on morphology, the identified STH eggs were the A. lumbricoides species (Figure 1).

Table 2. Distribution of identification of STH egg contamination in cabbage.

Cabbages	Helminth Egg Species					Total	%
	A. lumbricoides	T. trichiura	Hookworm	S. stercoralis	Trichostrongylus spp.		
Positive	1	0	0	0	0	1	3,33
Negative	29					29	96.6
Total	30	0	0	0	0	30	100

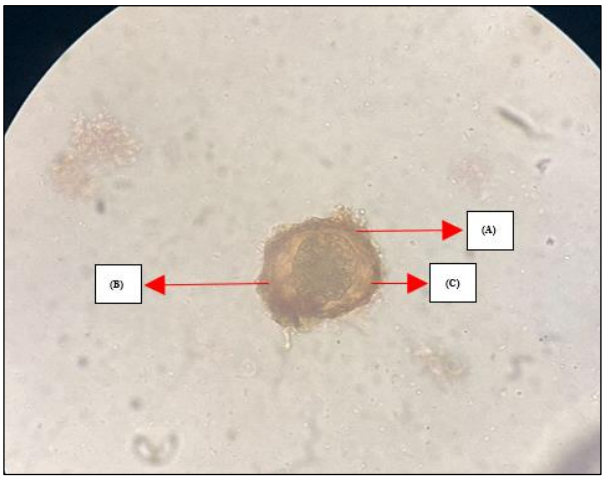

Figure 1. The fertile Ascaris lumbricoides eggs (40x magnification) with the following characteristics: (A) Albuminoid layer; (B) Chitin layer; (C) Vitelline membrane layer.

DISCUSSION

The STH egg contamination in cabbage at the Kebon Semai traditional market in Palembang City was 3.33%, along with A. lumbricoides species. This result is in line with research in the Jambi City traditional market (18.21%), in the Antasari Banjarmasin central market (11.76%), and in Debre Berhan City market, Ethiopia, 68.2%. [10–12] The first research took samples of vegetables sold on the ground with a base, while the second research took random vegetables without considering the

characteristics of their location. Both studies used the sedimentation method with 0.2% NaOH. [6,10] Otherwise, Widarti et al. found that all cabbages were not contaminated with STH eggs, even though they were sold in open and less clean places at the Traditional Market in Makassar City. The small number of samples, one cabbage per market, may result in the sample not being representative. The laboratory method used was saturated NaCl flotation.[9] Although other studies have stated that the flotation method has higher sensitivity, its effectiveness is influenced by the type of solution, specific gravity, flotation period, and homogeneity of the solution after centrifugation. The NaCl liquid after centrifugation also needs to be left to stand so the worm eggs can fully rise to the surface and be identified. The flotation method requires precision but provides more sensitive and clear results, while the sedimentation method is simpler but worm eggs can be covered by sediment contamination, so it is difficult to identify.[13] These differences may be what causes the different research results. [6,10,14]

The STH egg found was a fertile A. lumbricoides egg with cells inside. However, eggs that do not contain larvae cannot infect humans or cause any clinical symptoms when swallowed.[15] The fertile A. lumbricoides egg can develop into an infective form for 3 weeks in a condusive environment, including clay soil, high humidity, shaded soil, and a temperature of 25-30°C. However, these eggs will only survive for 5-7 days in an environment outside the soil.[16,17] Cabbage grown in soil media can potentially be contaminated with STH eggs. Wrinkled and stacked cabbage leaves also increase the risk of STH egg contamination. The curves of cabbage leaves form gaps that can be ideal places for STH eggs to stick. Stacked leaves also create humid conditions that support the survival of STH eggs. [18,19] STH egg survival also depends on the dryness level and at different durations in each species.[20] The A. lumbricoides eggs containing larvae can survive at a dryness level of 20% for 5 days. Meanwhile, T. trichiura eggs can survive for 2 hours. The length of time that STH eggs survive in these conditions can vary when combined with high temperatures and acidic or alkaline pH.[20] Cabbage has a high water content, around 92-93%, but in wilted conditions, it drops to 80%, and then STH eggs cannot survive for long. [21,22] The low pH in rotten cabbage also influences the survival of STH eggs because they only survive for 2 days in acidic conditions. [23–26] Therefore, the condition of the cabbage sample will determine both the number and type of STH eggs found, as well as variations in each study. However, the present and previous studies did not objectively measure the water content and pH. This study only observed the freshness condition as criteria of samples, causing the results to vary in each study.

The low egg contamination in this study indicates that the level of cabbage hygiene is quite satisfactory. All cabbages sold were placed on ceramic tables, showing attention to vegetable sanitation. Although the researcher judged that most of the vegetables looked clean and fresh, one sample was found to be contaminated with STH eggs and appeared slightly dirtier compared to the other samples.[27] Hygiene, environmental, and distribution factors also play a role in STH egg contamination. Sellers that clean the table, cover the place, and avoid vegetable contact with soil can reduce the risk of STH egg contamination. Soil can be contaminated by STH eggs that are excreted together with human feces, one of which is the use of compost.[6] In addition, defecation habits in locations around the garden can increase the risk of this contamination, either directly, by stepping on it, or through mechanical vectors such as flies.[10] The seller also can remove the rotten vegetables to avoid the presence of flies.[10,28,29] Vegetable distribution factors, namely unhygienic vegetable storage places during the distribution process can increase the risk of STH egg contamination.[27] Therefore, further research must assess hygiene to identify the risk factors involved.

Based on this research, it is suggested that the community needs to take preventive measures by cleaning cabbages properly. Proper vegetable processing begins with the proper washing process, one by one, and washing under clean running water, especially with vegetable soap, vinegar, or lemon juice,[30] to ensure the STH eggs can be lifted and discarded. This method is better than soaking because it prevents the reattachment of removed STH eggs, which can occur when the eggs and vegetables remain in the same container. The vegetables are also important to boil, and the boiled water is discarded. [5,31]

CONCLUSION

Although all cabbages sold at Kebon Semai Market in Palembang City are placed on a ceramic-coated table, there was still STH egg contamination in 3.33% of cabbages, an A. lumbricoides species. Therefore, it is important for related health institutions to educate the public about preventive measures by cleaning and consuming cooked vegetables.

REFERENCES

1. WHO. Soil transmitted helminth infections [Internet]. 2023 [cited 2024 Apr 26]. Available from: https://www.who.int/news-room/fact-sheets/detail/soil-transmitted-helminth-infections
2. Qomariyah N, Pratiwi D, Wardani K, Sulistiyowati R. Identifikasi telur soil transmitted helminths pada caisim (brassica chinensis) di Pasar Patikraja Kabupaten Banyumas. Herb-medicine journal. 2021;
3. Wardani YF, Lubis TA, Laksono IS. Trichuris dysentery syndrome, the neglected tropical disease: a case series. Paediatrica Indonesiana(Paediatrica Indonesiana). 2022;62(6):430–4.
4. Saskyarasmi S paramita, Permata Sari O, Munfiah S. Hubungan personal hygiene dan sanitasi dengan infeksi soil transmitted helminths pada anak usia sekolah dasar disekitar TPA. Jurnal pendidikan dan teknologi Indonesia. 2021 Jan 28;1(1):17–25.
5. Alifia LI. Peran air dan sanitasi terhadap pencegahan infeksi soil transmitted helminths. CoMPHI Journal: Community medicine and public health of indonesia journal. 2021 Mar 7;2(1):139–47.
6. Putri U, Dwi Fitri A, Program Studi Kedokteran M, Kedokteran dan Ilmu Kesehatan Universitas Jambi F, Kedokteran dan Ilmu Kesehatan Universitas Jambi F. Kontaminasi soil transmitted helminths pada sayuran kubis dan selada di pasar tradisional kota jambi. 2018.
7. Husaini F, Penelitian A, Rifiza C, Saragih R, Rahma H, Lubis IA. The difference of STH contamination in cabbage and lettuce at traditional modern markets in Medan. Jurnal Kedokteran STM [Internet]. 2021; Available from: https://jurnal.fk.uisu.ac.id/index.php/stm
8. Anggraini DA, Kristiawan A. Identifikasi telur nematoda usus pada sayuran kubis (brassica oleracea) di pasar tradisional, supermarket, dan warung makan Gresik tahun 2018. 2018;
9. Widarti. Identifikasi telur nematoda usus pada kol (Brassica oleraceae) di pasar tradisional Kota Makassar. Jurnal Media Analis Kesehatan. 2018 Jun;1(1).
10. Wasila M, Wirayudha R, Bonosari Soediono J. Overview of Contamination STH (Soil Transmitted Helminths) Eggs on Cabbage (Brassica oleracea (L.) in Sentra Antasari Market at Banjarmasin. Health Media. 2020;1(2):60–7.
11. Asfaw T, Genetu D, Shenkute D, Shenkutie TT, Amare YE, Yitayew B. Parasitic Contamination and Microbiological Quality of Commonly Consumed Fresh Vegetables Marketed in Debre Berhan Town, Ethiopia. Environ Health Insights. 2023;17.
12. Putri U, Hanina H, Fitri AD. Kontaminasi Soil Transmitted Helminths Pada Sayuran Kubis Dan Selada Di Pasar Tradisional Kota Jambi. Electronic Journal Scientific of Environmental Health And Disease. 2021;1(1).

13. Hidayati L, Dewi SR. Perbandingan telur cacing soil transmitted helminths pada daun kemangi (Ocimum sanctum) dengan metode flotasi dan sedimentasi. Jurnal Kedokteran Universitas Palangka Raya. 2023;11(1):13–8.
14. Asfaw T, Genetu D, Shenkute D, Shenkutie TT, Amare YE, Yitayew B. Parasitic contamination and microbiological quality of commonly consumed fresh vegetables marketed in Debre Berhan Town, Ethiopia. Environ Health Insights. 2023 Jan 12;17.
15. Sardjono TW. Helmintologi Kedokteran dan Veteriner. Malang UB Press; 2017.
16. Sutanto I, Ismid IS, Sjarifuddin PK, Sungkar saleha. Buku ajar parasitologi kedokteran. 4th ed. Jakarta: Badan Penerbit FKUI; 2008. 15–28 p.
17. Bogitsh BJ (Burton J, Carter CE (Clint E. Human parasitology. Academic Press; 2013. 430 p.
18. Kadek Swastika I. Prevalensi telur soil transmitted helminth pada sayuran kubis yang dijual di Kota Denpasar. Medika udayana [Internet]. 2019;8(11):2597–8012. Available from: https://ojs.unud.ac.id
19. Alemán-Báez J, Qin J, Cai C, Zou C, Bucher J, Paulo MJ, et al. Genetic dissection of morphological variation in rosette leaves and leafy heads in cabbage (Brassica oleracea var. capitata). Theoretical and Applied Genetics. 2022 Oct 3;135(10):3611–28.
20. Maya C, Torner-Morales FJ, Lucario ES, Hernández E, Jiménez B. Viability of six species of larval and non-larval helminth eggs for different conditions of temperature, pH and dryness. Water Res. 2012 Oct 1;46(15):4770–82.
21. Utama CS, Mulyanto A. Potensi limbah kubis dan sawi sebagai starter fermentasi. Jurnal kesehatan unimus. 2009;2(1):6–13.
22. Levitt J. Recovery of turgor by wilted, excised cabbage leaves in the absence of water uptake : a new factor in drought acclimation. Plant Physiol. 1986 Sep;82(1):147–53.
23. Tournas VH. Spoilage of vegetable crops by bacteria and fungi and related health hazards. Crit Rev Microbiol. 2005;31(1):33–44.
24. Maya C, Torner-Morales FJ, Lucario ES, Hernández E, Jiménez B. Viability of six species of larval and non-larval helminth eggs for different conditions of temperature, pH and dryness. Water Res [Internet]. 2012;46(15):4770–82. Available from: https://www.sciencedirect.com/science/article/pii/S0043135412004101
25. Kepmentan. Teknologi budidaya kubis dataran rendah. 2018;8–11.
26. Tournas VH. Spoilage of vegetable crops by bacteria and fungi and related health hazards. Crit Rev Microbiol. 2005;31(1):33–44.
27. Jasman RP, Sitepu R, Oktaria S. Perbedaan soil transmitted helminths (STH) pada sayuran di pasar tradisional dan pasar modern. Jurnal ilmu kedokteran dan kesehatan. 2019;6(1):84–93.
28. Nugroho C, Nur Djanah S, Asti Mulasari Fakultas Kesehatan Masyarakat S, Ahmad Dahlan U. Identifikasi kontaminasi telur nematoda usus pada sayuran kubis (Brassica oleracea) warung makan lesehan Wonosari Gunungkidul Yogyakarta tahun 2010.
29. Vanesa Yahyadi J, Sri Majawati E, Simamora A. Identifikasi telur cacing pada kubis (Brassica oleracea) pada pasar swalayan. J kedokteran meditek. 23(62).
30. Hajipour N, Soltani M, Ketzis J, Hassanzadeh P. Zoonotic parasitic organisms on vegetables: Impact of production system characteristics on presence, prevalence on vegetables in northwestern Iran and washing methods for removal. Food Microbiol. 2021 May 1;95.
31. Suryani D. Hubungan perilaku mencuci dengan kontaminasi telur nematoda usus pada sayuran kubis (Brassica oleracea) pedagang pecel lele di Kelurahan Warungboto Kota Yogyakarta. 2012;162–232.