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Review

Literature Review: Factors Influencing The Incidence Of Anemia In Farmers In The World

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ABSTRACT

Background: Studies on anemia have so far focused more on the incidence of anemia in pregnant women and adolescent girls even though farmers are one of the vulnerable groups suffering from anemia. The incidence of anemia in farmers has not been well documented, and there is still very limited research related to the determinants of anemia incidence in farmers. The study aim to know risk factor anemia in the farmers around the world

Methods: This study used the literature review method by collecting journals from google scholar, PubMed, and cienceDirect. Data collection using Anaemi A keywords Anemia AND farmers AND risk faktor. The results of the livelihood obtained a total of 4,959 articles which were then carefully selected so that 8 of the most relevant articles were obtained for article review.

Results: The results showed that there are three main faktors that cause the incidence of anemia in farmers, namely individual factors, environmental factors, and sociodemographic factors.

Conclusion: Risk factor of anemia in the farmers is individual factors, environmental factors, and sociodemographic factors.

INTRODUCTION

Anemia is a non-communicable disease caused by a number of red blood cells / hemoglobin below normal. Abnormal hemoglobin levels result in reduced ability to transport oxygen and cause symptoms in the form of paleness, fatigue, lethargy, dizziness, headaches, and firefly eyes.[1] The prevalence of anemia in the world is still high, especially in sub-Saharan countries, South Asia, the Caribbean, Oceania, and Asean including Indonesia.[2] Riskesdas data released by the Ministry of Health of the Republic of Indonesia (KEMENKES RI) in 2018, the proportion of anemia incidence was 31.2% spread across all provinces.[3]

The incidence of anemia in farmers is a neglected health problem and has not received serious attention from the government. This condition is exacerbated by the lack of data related to anemia in farmers in Indonesia. Even though there is a possibility

that the prevalence of anemia in farmers in Indonesia is high. Research on anemia in farmers conducted in India showed the prevalence of anemia in farmers reached 20% while research in Brazil showed the prevalence of anemia in farmers was 41%.[4,5]

Many risk factors can trigger the incidence of anemia in farmers, some of which are socioeconomic, environmental and behavioral factors. Socioeconomic factors include education, income, nutritional intake. This condition can affect the level of knowledge and purchasing power of highly nutritious foods.[6] Environmental factors include helminthic infections from agricultural environments that can cause anemia by absorbing blood or food juice in the intestines of infected people. While behavioral factors include length of work, history of pesticide exposure, and use of PPE. Community behavior that is not good so that it has an impact on increasing pesticide exposure due to incomplete use of PPE can trigger anemia due to blood cell damage.[7].

METHOD

This research uses the literature review method, which is to identify what researchers have written on a subject or topic that is done selectively, so as to produce a comprehensive report on the current position of science related to a particular topic.

1. Introductory question: What risk factors influence the incidence of anemia in farmers? With keywords risk factor, anemia, and farmers.
2. Inclusion criteria: journals have titles and contents relevant to the purpose, in English and Indonesian and fulltex, research journals published between 2013 – 2023. Exclusion criteria: journals that do not have a complete structure, review articles, journals that do not discuss risk factors for anemia in farmers.
3. The journal collection process is carried out using several search engines to find journals related to anemia risk factors in farmers. The journals used in this literature review were obtained through the database of health journal providers in the form of Pubmed, Google Scholar, Sciencedirect, and ResearchGate. Journal selection using the 2013-2023 Boundaries filter. From the keywords used, 4,959 articles were obtained, then eliminated the title and abstract with the topic to be discussed.
4. Each of the 8 research journals is read carefully from abstracts, objectives, data analysis, to obtaining information about risk factors for anemia in farmers.

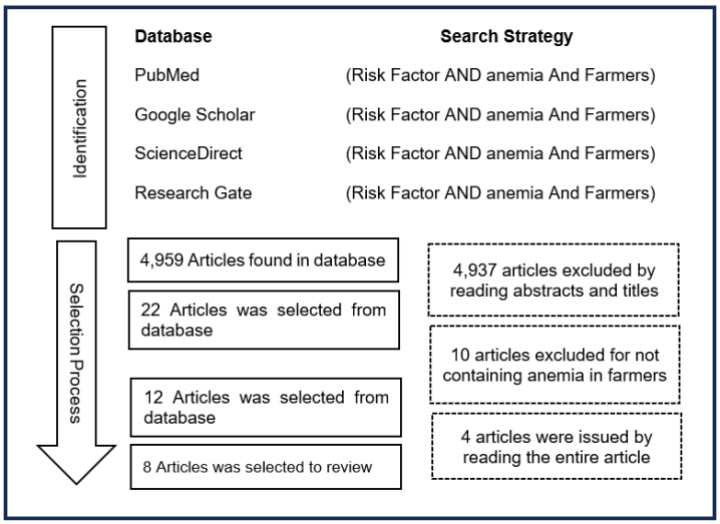

Figure 1. Prisma Method Risk Factor Anemia in the Farmers

Table 1. Literature Review Result Risk Factor of Anemia in the Farmers

Author	Tittle	Country	Design	Sample	Result
Silvila Oliviera Lopes, Sarah Aparecida Vieira Ribeiro, Dayane de Castro Morais, Elizangela da Silva Miguel, Laís Silveira Gusmão, Sylvia do Carmo Castro Franceschini, Silvia Eloiza Priore	Factors Associate with Anemia among Adults and the Elderly Family Farmers	Brazil	Cross sectional	297	The study was conducted on 297 farmers in Brazil in 2020 with an average age of 51.6 years. In this study the risk factors for anemia in farmers in rural Brazil are Food Insecurity / Inability to access food both short and long term (p value 0.01; OR 2.31; 95%CI: 1,379–3,869), Elderly (p value <0.01; OR 2,861; 95%CI: 1,642–4,983), homeownership (p value 0.012; OR 2,651; 95%CI: 1,237–5,681), and income level (*p value* 0,021 ; OR 0,531; 95%CI: 0.309–0.910).
Rihardini Okvitasari, Choiroel Anwar, Suparmin	The Relationship Between Pesticide Poisoning and the Incidence of Anemia in Potato Farmers in the Al-Farruq Farmer Group Association, Patak Banteng Village, Kejajar District, Wonosobo Regency in 2016	Indonesia	Cross sectional	29	This study had a sample of 29 potato farmers in Wonosobo in 2016 which were dominated by male farmers 93.1% and productive age 89.7%. In this study, the factor that influenced the incidence of anemia in potato farmers was the use of more than 3 brands of pesticides (p value 0.019; OR 9,653; 95%CI: 1,452 - 64,194).
Siti Aisyah Kurniasih, Onny Setiani, Sri Achadi Nugraheni	Factors Related to Pesticide Exposure and Its Relationship with the Incidence of Anemia in Horticultural Farmers in Gombong Village, Belik District, Pemalang Regency, Central Java	Indonesia	Cross sectional	40	The study was conducted on 40 farmers, most of whom were 67.5% adults and 87.5% male. The results showed that the factor that influenced the incidence of anemia in farmers was pesticide exposure (p value 0.043 RP: 5.333).
Nunik Tri Utami, Suhartono, Nikie Astorina Yunita Dewanti	Factors Influencing the Incidence of Anemia in Farmers in Candi Hamlet, Bandungan District, Semarang Regency	Indonesia	Cross sectional	106	The study was conducted on 106 farmers with an average age of 43.63 years. In this study the factor that influenced the incidence of anemia in farmers was working period (p value 0.327; OR: 2,062; 95%CI: 0.484 – 8.728). This means that farmers who have a working period of more than 5 years are 2 times more likely to suffer from anemia compared to farmers with a working period of less than 5 years.

Author	Tittle	Country	Design	Sample	Result
Ropen, Sugiarto, dan Parman	Factors Associated with the Incidence of Anemia in Vegetable Farmers	Indonesia	Cross sectional	58	The study was conducted on 58 farmers, the results showed factors that influence the incidence of anemia in farmers nutritional intake The results of the analysis test showed nutritional intake, namely protein (p value = 0.011) PR = 6,000 (1,672-21,531), iron (p value = 0.006) PR = 6,015 (1,799-20,111), vitamin C (p value = 0.047) PR = 3,667 (1,159-11,603), vitamin B12 (p value = 0.047) PR = 3,667 (1,159-11,603). Nutrient intake affects the incidence of anemia, Nutritional deficiencies can affect the formation of hemoglobin and normal red blood cells, causing anemia.
Norsita Agustina dan Norfai	Pesticide exposure to the incidence of anemia in horticultural farmers	Indonesia	Cross sectional	50	The study was conducted on 50 horticultural farmers in Landasan Ulin Utara Village, Banjarbaru City. The results showed that factors associated with the incidence of anemia in horticultural farmers were pesticide exposure (p value 0.029) and nutritional status (p value 0.004).
Muhammad Asif Syed, Aneela Atta Ur Rahman, Muhammad Ilyas Siddiqui, dan Ashique Ali Arain	Pesticides and Chemicals as Potential Risk Faktors of Aplastic Anemia: A Case–Control Study Among a Pakistani Population	Pakistan	Case Control	787	The study was conducted on 787 farmers in Karachi, Pakistan in 2020. The results showed that factors that influenced the incidence of aplastic anemia in farmers were family history of anemia (aOR=13.3, 95%CI: 3.66–48.50), pesticide exposure (aOR=2.1, 95% CI: 1.23–3.61), and chemical exposure (aOR=3.6, 95% CI: 2.06–6.34).
Mehwesh Taj, Tayyaba Shah, Syeda Kanwal Aslam, Sidra Zaheer, Faryal Nawab, Sumaira Shaheen, Kashif Shafique, Tahir Sultan Shamsi	Enviromental Determinant of Aplastic Anemia in Pakistan	Pakistan	Case Control	428	The study was conducted on 428 residents in Karachi, Pakistan who worked as farmers in 2016. The results showed that risk factors for anemia were pesticide exposure (p value 0.04 OR: 3.66; 95%CI: 1.04 – 12.88) and formal education (p value 0.04; OR: 1.58; 95%CI: 0.66 – 3.76).

RESULT AND DISCUSSION

Of the 8 journals that have been selected for this literature review, all use quantitative studies. The selection of study sites was carried out in various countries, namely Indonesia, Brazil, and Pakistan (Table. 1). Then all selected journals are read carefully starting from abstracts, objectives, methods, data analysis, and discussion to find out information related to anemia risk factors in farmers around the world. It is known that risk factors for causing anemia in farmers in various countries of the world are influenced by behavioral factors, sociodemographic factors, and environmental factors. The reason for the separation of risk factors into behavioral, sociodemographic and environmental factors based on the results of selected journals leads more to behavioral and environmental factors.

Individual Factors

Age

Age is one of the individual factors that can increase the incidence of anemia in farmers. Age relates to the length of time a person has spent working as a farmer. As in a review of research conducted by Lopes et al in Brazil shows that elderly farmers are more at risk of suffering from anemia. This condition is because elderly farmers have spent more time working in fields that come into contact with agricultural chemicals when fertilizing or spraying. This condition will cause the accumulation of toxic substances will be higher if it has worked in the long term.[5]

Ethnicity or ancestry

Anemia can occur due to various factors, one of which is heredity. Anemia that is known to be passed from parents to children is Thalassemia which occurs due to the shape of red blood cells that are crescent-shaped so that they cannot transport oxygen properly. Family history of anemia is also allegedly one of the factors that can increase the risk of anemia in farmers. A literature review of research conducted by Syed et al in Pakistan showed farmers who had a family history of anemia had a 1.58 times greater risk of suffering from anemia compared to people who did not have a family history of anemia.[13]

Mixing Pesticide

The use of pesticides as an agricultural pest eradicator can have a negative impact on the environment such as damaging soil fertility and can cause the risk of poisoning or disease due to pesticides. The increased risk of pesticide hazards can increase if you combine several types of pesticides together. Research literature study in Wonosobo that states mixing more than three types of pesticides in one spraying can increase the risk of suffering 10 times greater from anemia. Mixing several types of pesticides in one use is known to be a risk factor for anemia in farmers. Mixing more than three types of pesticides can cause pesticide toxicity to increase, in addition, mixing pesticides alone without the use of safe personal protective equipment increases the risk of pesticide exposure and poisoning.[8]

Sosiodemografis Factor

Nutrition Intake

Nutrient intake plays an important role in the metabolism of the human body, nutritional deficiencies will cause abnormalities in cell formation including blood cells. Intake of foods that contain high protein and iron will help the formation of normal red blood cells and hemoglobin. Lack of nutritional intake is one of the factors that cause anemia. The results of a literature review of research conducted by Ropen et al showed that farmers with less nutrient intake were at greater risk of suffering from anemia. Intake of nutrients in the form of protein, iron, vitamin C, and vitamin B12 are the constituents of hemoglobin and red blood cells, less consumption of foods containing these nutrients will cause the risk of anemia to be greater.[11]

Food Insecurity

Food insecurity is the ability to access nutritious food both in the long and short term. The inability to access nutritious food is caused by various factors such as low income and unavailability of access to nutritious food. Food insecurity is also one of the risk factors for anemia, especially farmers in rural areas. A literature study conducted by Lopes et al shows that those who have a low ability to access nutritious food in the short and long term are at greater risk of suffering from anemia.5 Food insecurity is closely related to the adequacy of nutritional intake, lack of nutritional intake will cause inhibition of metabolism and the formation of normal red blood cells.[11]

Education Level

The incidence of anemia also has a high risk in farmers with low levels of education, a literature study of Taj et al's research in Pakistan shows farmers with low education are at greater risk of suffering from anemia. Education is concerned with farmers' health knowledge and behavior. Higher education allows farmers to better understand the risk of chemical exposure hazards and know how to minimize them.[14]

Income Level

Income is one of the factors that influence the incidence of anemia in farmers, the level of farmer income is closely related to the level of affordability of high nutritional value foodstuffs. A literature study in the research of Lopes et al showed that farmers who have low income levels have a higher risk of suffering from anemia. The risk of anemia is higher due to the limited variety of food that can be purchased by farmers, especially animal products which tend to be more expensive. Limited consumption of animal foods causes a lack of nutrients so that the process of normal blood cell formation is hampered.[5]

Environment Factor

Pesticide Exposure

Pesticides are chemicals that are widely used by farmers to eradicate pests quickly and practically. Exposure to pesticides is known to be a risk factor for anemia in farmers, high and long-term pesticide exposure increases the accumulation of toxic substances in the body that can cause anemia.[10, 12, 13, 14] The entry of pesticides into the body can occur in several ways such as through the skin, eyes, inhalation, and mouth.[11] The presence of pesticides in the farmer's body will cause increased damage to red blood cells, red blood cell damage causes increased metahemoglobin content in the blood so that oxygen transport is not optimal.13 In addition, exposure to other agricultural chemicals such as arsenic also causes toxicity in the blood, causing anemia.[13]

CONCLUSION

Anemia is a non-communicable disease caused by various factors. The incidence of anemia in farmers can be caused by various factors, the results of literature studies that have been conducted are known that there are three groups of anemia risk factors in farmers, namely individual factors, sociodemographic factors, and environmental factors. Individual factors include age, heredity, and pesticide mixing behavior that does not comply with SOPs. Sociodemographic factors include nutrient intake, food insecurity, education level and income level. Environmental factors that are risk factors for anemia in farmers are exposure to pesticides and agricultural chemicals.

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