Assessment on Possible Adverse Pesticides Effect on Human Health in Lucknow District, Uttar Pradesh

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Abstract

The extensive use of chemical pesticides in agriculture has significantly increased crop productivity; however, their indiscriminate application poses serious risks to human health and the environment. The present study assessed the adverse health effects of pesticide exposure among farmers in Lucknow district, Uttar Pradesh. A multistage stratified purposive-cum-random sampling technique was employed during 2020–21 and 2021–22. Two agricultural blocks, Mall and Malihabad, were selected purposively, followed by the random selection of ten villages and 100 pesticide-using farmers. Primary data were collected through a structured questionnaire and personal interviews, while secondary information was obtained from published literature and official sources. The collected data were analyzed using SPSS (Version 21) and descriptive statistical tools. The findings revealed that a large majority of farmers were aware of the health hazards associated with pesticide exposure, yet nearly half reported experiencing discomfort or illness after pesticide application. Commonly reported symptoms included headache, dizziness, skin rashes, nausea, vomiting, and blurred vision. Most respondents recognized the harmful effects of pesticides on human health and the environment, although misconceptions regarding pesticide toxicity and safe handling practices persisted. The study also found increasing pesticide consumption over the study period and limited awareness regarding long-term environmental contamination and alternative pest management practices. The results emphasize the urgent need for farmer education, promotion of safe pesticide handling, adoption of integrated pest management practices, and strengthening of awareness programs to minimize pesticide-related health risks and environmental pollution.

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Introduction

Food is essential for survival of human. It gives energy and supplements for body development and maintenance. The public health effects of pesticides have been known as undesired effects of chemical pesticides on human health known as serious health concern during the past decades. Market survey report revealed that approximately 5,684 million pounds of pesticides are practically applied in agriculture field annually throughout the world. Insect killer is a combination of substances which is used in agriculture in order to safeguard crops or plants against pests, weeds or diseases, as well as humans from vector-borne disease [13]. Commonly pesticides included all the insecticides against insects, fungicides against fungicides, rodenticides against rodents, herbicides used against weeds or herbs, in addition to growth regulator are used for growth and development of plants all these feature of pesticides used in agriculture [1]. From time to time, these pesticides products are also used as second-hand purposes. Besides, further less well-liked uses of pesticides as used in pet shampoos preparation, construction materials preparation, and ship bottom preparation because they eradicate or avoid against the unwanted species. A Number of pesticides have been linked not only inhuman health but also environmental issue that's why in pesticides used in agriculture although several of them have been superfluous. Human contact with pesticides depends on straight contacts the pesticides by means of the skin, drinking, eating. Not only for humans but also animal body as well. Generally, pesticides go to human/animal body and metabolized. In some cases they excreted as well as store in individual fat also [2].

Many negative health issues are linked by means of chemical pesticides, dermatological linked with skin, gastrointestinal disease, neurological disorder connected to brain, carcinogenic associated by means of cancer, respiratory linked to respiratory tract, reproductive linked to offspring, as well as endocrine effects. Residual of pesticides not only found in everyday foods items but also in beverages as well as in several fast foods like in ripped meals. In even some cases pesticides residue existing in beverages or fruit juice, snacks, drinks, as well as animal feeds. It should be revealed from many researches to neither washing nor peeling entirely safe because after removal of residues from the pesticides cover are not possible cent percent but washing with hot water at least 20 to 25 minutes it will be safe for consumption. A guideline shows that absorption of destructive element and pesticide are not used beyond the legislatively programmed protected boundary in each and every one commodity. On the other hand, "safe limits" may misjudge as a result of people and it cause genuine health issues correlated with contact of two or more substance because they showing the synergistic special effects in real-life [6]. Extreme pesticides boundary have been observed in human being breast milk cause prenatal contact along with this causes severe health related effects in children [7]. Above fact, pertain to the pesticides side effect in relation to human being health. Pesticides effects have been examined seriously, this paper mainly focuses on healthiness property regarding to human being health which are associated to contact of chemical pesticides either directly or indirectly [8]. "Glyphosate," is a widely used pesticides in agriculture, is an organophosphate pesticide. Therefore, present study conducted entitled, "Assessment on possible adverse pesticides effect on human health in Lucknow District, Uttar Pradesh".

Methodology

The Present study was conducted at Lucknow district, Uttar Pradesh. The farmer's mostly taken three crops in an agricultural year and they do spray of pesticides twice, in some cases they applied spray thrice hence they spray more than six times in an agriculture year [25]. For the better yield they were used various kinds of pesticides such as insecticide, fungicide and weedicide throughout the year and get exposed.

Sampling technique:

Trough Multistage stratified purposive cum random sampling methods following during the choice of district, block, villages in addition to farmers [3] (specially selected are those farmers which is using pesticides in his farm).

District Lucknow of U.P. was chosen purposively. Lucknow district divided into 8 blocks; out of 8 blocks two blocks selected purposively namely Mall and Malihabad. Prepare a list of all villages falling under Mall and Maliyabad blocks. 5-5 villages were chosen from Mal and Maliyabad block randomly for study during (2020-21 and 2021-22).

10 farmers (specially selected are those farmers which is using pesticides in his farm) from each of selected villages. Overall sample size of 100 was taken following the random sample to fill the schedule or questionnaires during both the years. A pre structured questionnaire was prepared according to study and primary data collected through survey by personal interview methods and secondary data collected from internet, books, journals, magazines, published research papers, annual reports, statistical information of Agriculture sectors [5,6,7, 8,9,10,11,12, 13-24].

Data analysis

The data analyzed through Excel sheet (window 7) and percentiles were used for data analysis. Collected, Primary and Secondary data in present study were analyzed in SPSS software version 21 (2018)**.**

Table 1:Selection of District, blocks and villages in study area

S. No.	Particulars	Selection of study area	Sampling Technique
1.	**District**	Lucknow	Purposive

2.	**Block**	Mall	Malihabad	Purposive
3.	**Villages**	Gopal Pur, Latif Pur, Siswara, Tilan and Visunpur	Adampur, Atari, Jamolia, Harhar Pur and Danaur	Random

Result and Discussion:

Table-2 revealed that impact, risk and hazards of pesticides on human health

Table2: Understanding and knowledge of farmers about effect & hazards on health and safe handling of pesticide

Particular	**Percentage of farmers**	
	2020-21	**2021-22**
Knowledge about exposure to pesticides' adverse health effects		
Yes	94	95
No	6	5
Knowledge about the risks and hazards from pesticides		
Yes	96	97
No	4	3
Source of Knowledge /information		
Agriculture officer	60	64
Environmental protection authority	20	18
Health office	18	17
Other	2	1
Sanitation practices used after handling/ spraying pesticides		
Yes, immediately	86	90
Yes, after some time	10	8
No, didn't	4	2
It did not matter	-	
Do you eat/drink/play with your children immediately after handling pesticides		
Yes	10	13
No	84	85
Sometimes	6	2
Pesticide consumption used on farm increase or decrease each passing year		
Increase	66	70
Decrease	17	15
Didn't know	17	15
Experience of discomfort/illness after pesticide application		
Yes	47	49
No	53	51
Type of experiences faces or symptoms appeared		
Dizziness	26	24
Head ache	53	56
Blurred vision &extreme sweating	14	12
Hand tremor	7	8
Narrow pupils/insomnia	-	-
Difficulty in breathing	-	-
Excessive salivation	-	-
Nausea/vomiting	-	-
Skin rashes	-	-
Irregular heartbeat	-	-
Other	-	-
Actions to be taken in case of pesticide intake		
Make the person to drink lot of water	4	3
induce vomiting	55	58
don't induce vomiting	5	4
do nothing or ignore	1	1
take the victim to the nearby hospital	35	34
Other	-	

Pesticide incidence in family		
Yes	5	7
No	95	93

Table-2 depicted that level of understanding of sample farmers about impact, risk and hazards of chemical pesticides on human health. Data revealed that 94 per cent and 95 per cent of sample respondents were very well aware that contact to pesticide was cause adverse healthiness special effects during 2020-21 and 2021-22 respectively. It was also informed by majority of sample farmers 96 per cent 97 per cent that they have been faced the risk and hazards from pesticide during 2020-21 and 2021-22, respectively. 60 per cent and 64 per cent replied that agriculture officer were major source of information provider during 2020-21 and 2021-22, respectively followed by environment protection authority and health officer. Handling and personal impact of pesticide by user were examined and it was found that mostly of respondents 86 per cent and 90 per cent take a bath/clean their hand over straight away after handling/spraying of pesticide during 2020-21 and 2021-22, respectively followed by washed/took bath after sometime and did not wash/take bath after pesticide application during both the years. 84 per cent and 85 per cent of respondents kept distance with family member foods etc immediately after pesticide use during 2020-21 and 2021-22, respectively. Rest of them either got involved in eating the pesticides or playing with children after handling pesticide regularly or after sometime during both the years. In Response to pesticide cause individual healthiness was observed and the interrelated facts exposed that about partially sample respondents 47 per cent and 49 per cent feel embarrassment/sickness after contact with pesticide application during 2020-21 and 2021-22, respectively followed by feel dizziness, headache and hardly any feel unclear vision or extreme sweat during both the years. Readiness/preparedness about the risk of pesticide intake was recorded. It was found that 55 per cent and 58 per cent of sample respondents told that they would try to induce vomiting if any person infest or expose to pesticide during 2020-21 and 2021-22 respectively followed by take victim to the nearest hospital. Rest of them had the same opinion that they would make the person to drink a lot of water and did not induce vomiting to victim during the both years. It was also reported from survey that 95 per cent and 93 per cent of sample farmers did not notice any incidence of pesticide poisoning in their family during 2020-21 and 2021-22. Some of them reported of death after pesticide intake during both the years.

It revealed from Table -3 that the sample farmers were given some statements and opinions/agreements were sought after the interview. It was found that 98 per cent and 97 per cent of respondents agreed upon the disclosure to pesticides have cause undesirable effect on human being health during 2020-21 and 2021-22. 60 per cent and 57 per cent disagreed during 2020-21 and 2021-22, respectively. 22 per cent and 20 per cent had agreement on statement “the human body could develop a kind of immunity against pesticides” during 2020-21 and 2021-22, respectively. Majority of respondents 70 per cent and 75 per cent agreed upon the statement “the stronger a pesticide smell the more toxic it is” during 2020-21 and 2021-22.

It revealed from tabl-3 that a mixed response were received on the statement “being exposed to pesticides could make you sick in different ways either immediately or even after several years” and data clearly depicted to50 per cent and 54 per cent of farmers agreed during the 2020-21 and 2021-22, respectively. 35 per cent and 31 per cent did not have any idea and 12 per cent and 10 per cent of respondents disagreed on above statement during 2020-21 and 2021-22, respectively.

It revealed from data (table-3) that majority of respondents 55 per cent and 58 per cent agreed, 20 per cent did not know and 17 per cent farmers and 15 per cent producers disagree by statement “traces of a number of pesticides could be found in the environment even years after their use” during 2020-21 and 2021-22, respectively. It also revealed from table-3 that almost casual responses were received on the statement “there is no solution other than to use pesticides, control pests” 36 per cent and 38 per cent did not know, 26 per cent farmers and 25 per cent farmers disagree, 25 per cent farmers and 23 per cent farmers agreed while 13 per cent with 14 per cent producers show they don’t know about pesticides precaution they neither sure nor disagree during 2020-21 and 2021-22, respectively. It depicted from table-3 that majority of sample respondents 65 per cent and 67 per cent were in agreement with the statement “the use of pesticides has some adverse effect on beneficial organisms which help to reduce pest populations during 2020-21 and 2021-22, respectively, while 16 per cent and 12 per cent respondents did not know about the above statement during 2020-21 and 2021-22, respectively. 10 per cent and 11 per cent respondents neither agreed nor disagreed on the above statement during 2020-21 and 2021-22, respectively.

It was also revealed from Table-3 that 51 per cent and 54 per cent of sample respondents agreed with the statement “sex pheromone trap can control several kinds of insect pests in Brinjal, tomato, paddy, and pulses crops” whereas 43 per cent and 40 per cent respondents did not have any idea about sex pheromone trap during 2020-21 and 2021-22, respectively. 46 per cent and 47 per cent of sample farmers had disagreement with the statement “bio-pesticides can kill the insect pests immediately” during 2020-21 and 2021-22, respectively. 41 per cent and 47 per cent respondents did not know about this during 2020-21 and 2021-22, respectively. Table-3 clearly depicted that 26 per cent and 27 per cent of respondents disagreed with the statement “like synthetic pesticide, bio-pesticides can also harm the human”, whereas one-fourth of respondents disagreed, 24 per cent individual farmers and 25 per cent farmers hesitate

in answer they don't know about pesticides substitute and their application they neither decided nor disagree and 14 per cent farmers and 12 per cent farmers had agreement on the above said statement during both the years.

Table3: Understanding and knowledge of farmers about basic technical information about chemical pesticide

Sr. No.	Statements	Percentage of farmers							
		Agreed		neither agreed nor disagreed		disagreed		Didn't know	
		2020-21	2021-22	2020-21	2021-22	2020-21	2021-22	2020-21	2021-22
1	Pesticides caused adverse health impact on human being	98	97	-	-	-	-	2	3
2	The human body can develop a kind of immunity against pesticides	22	20	8	11	60	57	10	12
3	The stronger a pesticides smell the more toxic it is.	70	75	10	9	8	6	12	10
4	Being exposed to pesticides can make you sick in different ways either immediately or even after several years	50	54	4	3	11	12	35	31
5	Traces of some pesticides can be found in the environment even years after their use.	55	58	8	7	17	15	20	20
6	There is no solution other than to use pesticides to control pests.	25	23	13	14	26	25	36	38
7	The use of pesticides has some adverse effect on beneficialorganisms which help to reduce pest populations	65	67	10	11	9	10	16	12
8	A sex pheromone trap can control several kinds of insectpests in Brinjal, tomato, paddy, pulses crop	51	54	2	2	4	4	43	40
9	Bio-pesticides can kill the insect pests immediately.	4	3	9	10	46	47	41	40
10	Like synthetic pesticides, bio-pesticides can also harm the human.	14	12	24	25	26	27	36	36

Table 4: Information about pesticidal incidence & probable impact on health & environment

Particulars	Percentage of respondent	
	2020-21	2021-22
Do you know that after using pesticide its residues are missing out in the air, in the soil, burn, displaced in the ground, flowing in water as well as plant parts		
Yes	87	88
No	13	12
What is your opinion about effect of pesticide on environment		
Not harmful	3	2
Moderately harmful	30	29
Very harmful	59	63
Don't recognize	8	6
Have you heard of any incidence caused in community within last two years		
Yes	87	88
No	12	11
Don't recognize	1	1
What are the probable impacts of pesticides on our health		
Dizziness	5 (5.75)	4(4.55)
Head ache	12 (13.79)	14(15.91)
Blurred vision Excessive sweating	4 (4.60)	3(3.41)
Hand tremor	1 (1.15)	1(1.14)
Narrow pupils/insomnia	2 (2.29)	2(2.27)
Difficulty in breathing	7 (8.05)	6(6.82)
Excessive salivation	6 (6.90)	5(5.68)
Nausea/vomiting	22 (25.29)	20(22.73)
Skin rashes	24 (27.59)	30(30.09)

Irregular heartbeat	3 (3.45)	2(2.27)
Other	1 (1.15)	1(1.14)

Table 4: depicted to 59 per cent farmers and 63 per cent farmers sure that pesticide had caused very harmful effect on environment during 2020-21 and 2021-22, respectively. It was clearly depicted that 87 per cent producers and 88 per cent producers knew very well about pesticides and their residues are missing out in the air, in the soil, burn, displaced in the ground, flowing in the water as well as plant parts (seeds, fruits, stems and leaves) during 2020-21 and 2021-22, respectively. Result clearly depicted that general public knew the fact that chemical pesticide had adverse impact on environment and health. Table 4 also depicted that 87 per cent and 88 per cent of respondents did not heard about any incidence which caused by hazardous pesticide occurred within recent two years, whereas only 13 per cent and 12 per cent of respondents reported pesticidal incidence during 2020-21 and 2021-22, respectively. The specific incidence cited by respondents were cancer, vomiting, skin rash, suffocation, many birds extinction, nausea, ground water pollution caused due to increased use of pesticide. 27.59 per cent and 30.09 per cent of respondents observed that skin rashes were probable impact of pesticide on our health, whereas nausea/vomiting, headache, difficulty in breathing, excessive salivation like impact were recorded by 25.29 per cent of respondents and 22.73 per cent of respondents, 13.79 per cent of respondents and 15.91 per cent farmers, 8.05 per cent farmers and 6.82 per cent farmers while 6.90 per cent farmers, during 2020-21 and 2021-22, respectively. The result showed that general public was aware very well to possible adverse impact of chemical pesticide on human being health. Data also revealed those publics are willing to pay higher prices for organically grown / certified produce to cope up with pesticides effect.

Summary And Conclusion

The findings indicate that a considerable proportion of respondents experienced discomfort or health-related problems following pesticide exposure. Many participants reported that, in the event of accidental pesticide ingestion, they would attempt to induce vomiting as an immediate response. However, the majority of farmers stated that no cases of pesticide poisoning had occurred among their family members. Most respondents acknowledged that pesticide exposure has harmful effects on human health and agreed that stronger-smelling pesticides are generally perceived to be more toxic. Opinions were divided regarding whether pesticide exposure could result in both immediate and long-term health problems. A large proportion of respondents were unaware that pesticide residues can persist in the environment for many years after application. Similarly, mixed opinions were observed on the belief that pesticide use is the only effective means of pest control.

The study further revealed that most farmers recognized the adverse effects of pesticides on beneficial organisms that naturally help suppress pest populations. A majority also agreed that sex pheromone traps are effective in controlling insect pests in crops such as brinjal, tomato, paddy, and pulses. In contrast, most respondents disagreed with the statement that bio-pesticides are as harmful to humans as synthetic pesticides. Among the health effects associated with pesticide exposure, skin rashes were the most frequently reported symptom, followed by nausea, vomiting, headache, breathing difficulties, and excessive salivation. Overall, the findings demonstrate that the general public possesses a reasonable level of awareness regarding the adverse impacts of chemical pesticides on human health. Furthermore, many respondents expressed their willingness to pay a premium for organically grown or certified agricultural products as a means of reducing the health risks associated with pesticide residues

The present study concludes that farmers frequently apply chemical pesticides in excessive quantities with the objective of achieving higher agricultural productivity. However, many farmers have limited awareness of the long-term health and environmental consequences associated with the indiscriminate use of these chemicals. The findings suggest that inadequate scientific knowledge and poor adherence to recommended pesticide application practices contribute to environmental degradation and increased health risks. Although pesticide containers clearly provide instructions regarding dosage and safe usage, some farmers are unable to understand the information due to literacy constraints, while others intentionally disregard the guidelines in the belief that higher doses will result in better crop yields. The study also indicates that consumers are increasingly aware of the hazardous effects of chemical pesticides and recognize their potential adverse impacts on human health. These findings highlight the need for effective farmer education, improved extension services, and the promotion of safe and sustainable pest management practices to reduce pesticide-related risks.

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