Testing The Antimicrobial Activity of Nanosilver on Floor Cleaning Liquids Microscopically With Microscope Instruments Olympus CX-23

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Abstract. This basic research is to obtain data on the strength of nanosilver as an antimicrobial material in floor cleaning liquid products. This is very necessary for the creation of innovative floor cleaning liquid formulas that are more environmentally friendly and have anti-virus activity. Floor cleaners that already exist on the market generally have limited antimicrobial activity, namely anti-bacterial and anti-fungal only. The Covid 19 case has triggered research into the discovery of antimicrobials that have antiviral activity and their application in daily products that are used continuously. Antimicrobials up to nano silver antivirals are environmentally friendly and do not leave chemical residues in the environment and are not harmful to humans as users. Nanosilver works at low to high concentrations without harming humans and the environment. Even at low concentrations, nanomaterials have many times the activity compared to the same material but not in nano form. This is the advantage of nano materials that can be relied on to be applied to various products. The aim of this basic research is to obtain data on the antimicrobial activity of nanosilver which can be used as a basis for making innovative floor cleaning fluid formulas. The results obtained are yellow colloidal nanosilver with identification of two instruments. In UV-Visible, UV absorption characterization data for nanosivers at 430 nm was obtained. The TEM instrument provides diameter information. Collections of nanosilver atoms have a diameter of 20-40 nm. The results of the antimicrobial test were obtained with the help of microscopic images taken by the Olympus CX-23 microscope instrument. The creation of this innovative floor cleaning liquid formula is said to be successful if a formula with the lowest nanosilver addition is obtained which is able to provide an antibacterial effect close to that of conventional floor cleaners. The concentration of nanosilver in this selected formula is used as the basis for making commercial floor cleaning liquid products. In making the formula, it was found that the nanosilver concentration of 20 ppm had the same activity as conventional floor cleaners. Innovative floor cleaning fluid contains 20 ppm nanosilver providing an antimicrobial effect twice as strong as floor cleaners without nanosilver. Thus, it can be concluded that the best formula with the most effective antimicrobial activity is the 20 ppm nanosilver formula.

Keywords: Nanosilver, floor cleaning fluid, antimicrobial, anti virus, businessman.

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1 Introduction

The background is the current need on the Surabaya State University campus to build income generating after becoming PTNBH. Lecturer research results that can be applied in commercial products should naturally be realized immediately. Researchers have conducted research related to the synthesis of nanomaterials and their application in everyday products. Research on nanosilver in relation to antimicrobial and antiviral activity has been carried out. Nanosilver has been proven to have very high antimicrobial and antiviral activity. Supported by previous research data, nanosilver is very strong in eradicating bacteria that cause leprosy, herpes and even cancer. The virus that causes Covid 19, which is a corona virus, also becomes weak in the face of nanosilver. The commercial products currently needed by the University are floor cleaning products for on-campus and off-campus needs as superior products for commercialization. Starting to create the product formula, research is needed to test the strength of nanosilver as an environmentally friendly antimicrobial and antiviral material. To determine the antimicrobial power of nanosilver, the problem needs to be formulated as follows:

1. How much activity does nanosilver have as an anti-bacterial in floor cleaning products?
2. How much activity does nanosilver have as an anti-fungus in floor cleaning products?
3. How is this innovative floor cleaner a superior product for commercialization?

To solve problems 1 and 2, laboratory research is needed in the form of testing the strength of nanosilver in killing microbes in the form of bacteria by testing several bacteria which are generally found on the floor, namely the *Escercia colli* bacteria which causes various diseases from diarrhea, mouth ulcers to acne and *Salmonella typhi* which causes typhoid. Testing on the fungus *Rizophus aspergillus* which grows a lot in the environment, including floors. Trials were carried out on nanosilver material, nanosilver + conventional floor cleaner and on conventional floor cleaning products without nanosilver. The results obtained became the basis for creating a new formula, namely an innovative floor cleaner that is more environmentally friendly. Nanosilver concentrations that are effective for germs that exist and live on the floor or environment were discovered in this research activity. If the problem solving is successful, floor cleaning fluid will be produced with a new, more environmentally friendly formula containing nanosilver. This product will then be marketed as an innovative superior product resulting from research. Initial marketing exercise data will answer problem formulation no. 3. By involving the academic community with the help of awareness to quickly become independent, the realization of this product will be accepted and become the new hope of PTNBH University.

The Covid 19 pandemic has triggered research into the discovery of antimicrobials and antivirals that are environmentally friendly and friendly to human life [1]. Nanosilver is one of the superior materials that has been tested in various cases of diseases caused by microbes to viruses, especially the corona virus that causes Covid 19 disease [2]. Nanosilver is effective in killing bacteria that cause leprosy. People with leprosy in Babatjerawat, Benowo Surabaya. The application of nanosilver in this group of people is by drinking it and also applying it to skin ointment products. So nanosilver is used as a treatment from within and from outside [3]. Nanosilver has biocompatible properties, meaning it is safe to use in the body and does not

cause chemical residues in the body. This means that nanosilver is also environmentally friendly when it enters the human body and also when it enters the environment [4].

Nanosilver has also been applied to herpes which is endemic in one of the Islamic boarding schools or boarding schools in Kediri. This disease is transmitted because the water facilities are centered and flow throughout the cottage area. If one person is sick and accidentally enters a body of water, it immediately spreads throughout the water flow in the bathtubs and ablution places. In this way, one person gets herpes, followed by other students who become infected and get herpes too [5]. This is because the boarding school also accommodates drug rehabilitation students who are sick with herpes and even Aids [2]. This cannot necessarily be blamed on the boarding school managers, because they must be fair in developing the younger generation from various circles.

Nanosilver has also been applied to the community specifically at the drug rehabilitation center, namely Pondok Inabah Sukolilo [6]. By drinking nanosilver with nanogold regularly, they experience gradual recovery from damaged nerves and skin tissue. Germs, which are generally microbial types of bacteria found in skin tissue wounds, dry out and heal [7].

Nanosilver has also been applied to cancer by being taken by cancer survivors at the cancer service center at the Indonesian Cancer Museum Jl. Kayoon Surabaya. With this application, cancer sufferers do not experience an increase in stage for 6-12 months [8]. This achievement is already very good for a cancer drug candidate. Wider application requires closer collaboration with national health managers so that new cancer drugs based on silver nanomaterials or nanosilver can be immediately realized [9].

With the experience of clinical trial research on patients with various diseases, but it has not yet become a drug recommended by the medical world, the next effort is to use nanomaterials as active ingredients in products that are used daily by humans, including soap, lotion, shampoo, liquid. dishwasher and floor cleaner [10]. Next, make these products into campus entrepreneurship to show the existence of research results and researchers on campus [11].

Through funding for this research, products for daily use of floor cleaning fluids were then gradually realized [10]. With the active material nanosilver, it gradually reduces the antiseptic carbol material which is less environmentally friendly [12]. Carbol chemicals are not environmentally friendly and will pollute the environment if the residue is disposed of directly [13]. Specially storing and disposing of it requires special facilities that not every household has. The best alternative is to gradually reduce the active antiseptic or anti-bacterial ingredients with nanosilver which is more environmentally friendly [14].

The antibacterial power of nanosilver needs to be tested for common bacteria on the floor [15]. This research will produce this data as a basis for making formulas or determining the concentration of nanosilver needed in floor cleaning products [16]. Price calculations are also considered because this superior product will be commercialized at a later date. Research over the next 5 years has been prepared to create other commercial products.

2 Method

2.1 Nanosilver Synthesis Method

The laboratory method is the synthesis of nanosilver nanomaterial using the Buttom-up method from Silver Nitrate as a base material which is then reduced in a cold process with the reductant Ascorbic Acid. The resulting nanosilver is then used to make a floor cleaning formula with variable concentrations. Look for the lowest nanosilver concentration that is able to kill germs. The creation of this innovative floor cleaning liquid formula is said to be successful if a formula with the lowest nanosilver addition is obtained which is able to provide an antibacterial effect close to that of conventional floor cleaners. The concentration of nanosilver in this selected formula is used as the basis for making commercial floor cleaning liquid products.

2.2 Nanosilver Activity Test

The method for testing the strength of nanosilver in killing microbes in the form of bacteria is by testing several bacteria that are generally found on the floor, namely the *Escercia colli* bacteria which causes various diseases from diarrhea, mouth ulcers to acne and *Salmonella typhi* which causes typhoid. Testing on the fungus *Rhizopus aspergillus* which grows a lot in the environment, including floors. Trials were carried out on nanosilver material, nanosilver + conventional floor cleaner and on conventional floor cleaning products without nanosilver. Bacteria and fungi are obtained from the environment, namely the floor and grown in agar media. The colonies that develop are then separated based on different types from each other. Each was developed again in a clean medium from the colony. Next, each colony was used to test the antimicrobial strength of the prepared material. Observations used a microscope and were carried out over a period of 5-10 minutes. The time required to kill each colony is used as a reference for antimicrobial or antibacterial strength. The results obtained became the basis for creating a new formula, namely an innovative floor cleaner that is more environmentally friendly. Nanosilver concentrations that are effective for germs that exist and live on the floor or environment were discovered in this research activity. If the problem solving is successful, floor cleaning fluid will be produced with a new, more environmentally friendly formula containing nanosilver. This product will then be marketed as an innovative superior product resulting from research.

3 Results and Discussion

Nanosilver is synthesized from the basic material $AgNO_3$ 1000 ppm in the form of a colorless solution. First, heat (1000-20) ml of water in a beaker until it boils. Next, 2 grams of sodium citrate is added to boiling water. Then add 20 ml of $AgNO_3$ to the beaker so that it becomes a Nanosilver solution with a concentration of 20 ppm, then stir and wait until the solution changes from colorless to grayish yellow. After the color change occurs, the heating will be stopped and the resulting grayish yellow colloid is nanosilver. Nanosilver is ready to be analyzed with UV-Visible spectrophotometer and TEM instruments [6].

3.1 Nanosilver Characterization Using UV-Vis Spectrophotometer and TEM

The results of the nanosilver synthesis were characterized and analyzed using two instruments, namely a UV Visible instrument and a TEM instrument. Characterization of the stability of the Nanosilver solution was observed through the maximum difference

(wavelength) between the initial synthesis and after being stored for 8 weeks using UV-Vis Spectrophotometry. Meanwhile, the characterization of the shape and size of 20 ppm nanosilver was observed using a TEM instrument with a magnification scale of up to 20 nm [1].

Synthesis of nanosilver using the Buttom-up method from Silver Nitrate as a base material which is a colorless solution which is then reduced in a cold process with the reductant Ascorbic Acid. In this synthesis, a yellow colloidal with a gray surface is produced in a faster time and at a cheaper cost.

Fig. 1. Synthesis of Nanosilver from Silver Nitrate.

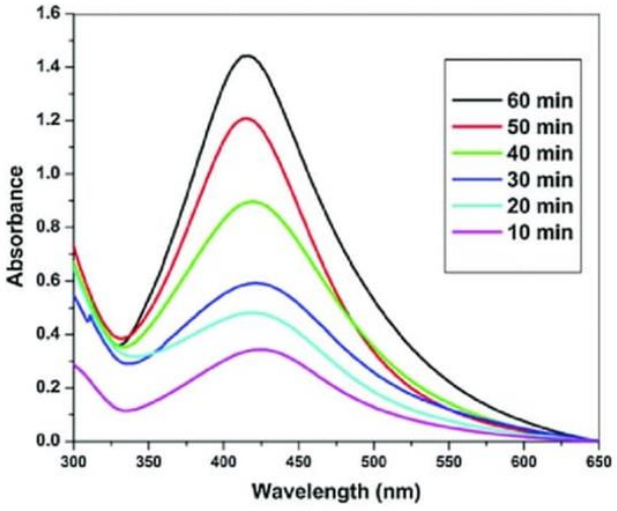

Fig. 2. UV-Visible Spectra of Nanosilver.

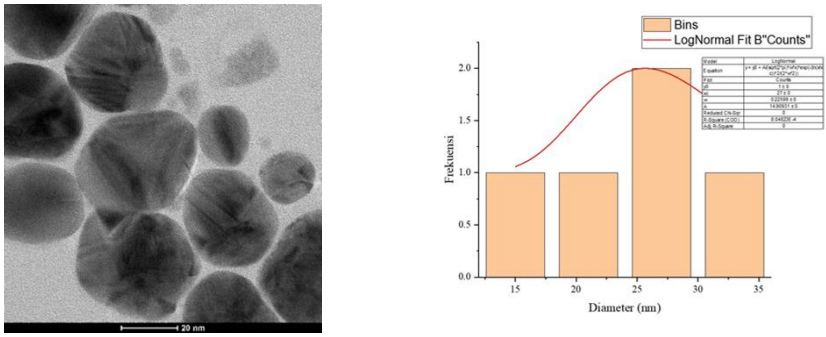

Fig. 3. TEM image of synthesized nanosilver.

3.2 Nanosilver Antimocrobial Activity Test Results

Antimicrobial activity was carried out by observation using an Olympus CX-23 optical microscope supported by OptiLab software. Observations were carried out every week for 8 weeks with a magnification of up to 100 times. Data analysis can be done by observing the microscopic shapes of the microbes observed. Identification refers to the books "Introduction to Common Tropical Molds" and "Pictorial Atlas of Soil and Seed Fungi".

Table 1. Antimicrobial activity.

Sampel	Hasil Pengamatan Makroskopis			
	Minggu ke-1	Minggu ke-2	Minggu ke-3	Minggu ke-4
K (+)				
K (-)				
F1				
F2				
F3				

Table 2. Microscopics observation.

Sampel	Hasil Pengamatan Mikroskopis			
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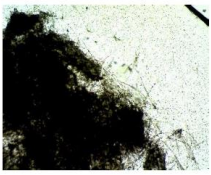
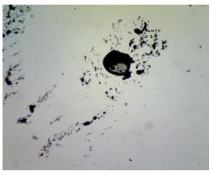
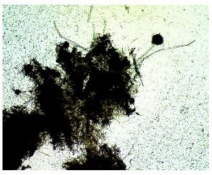
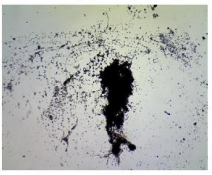
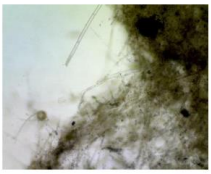
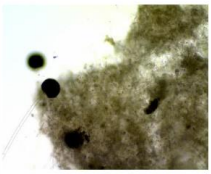
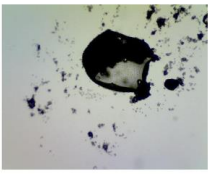
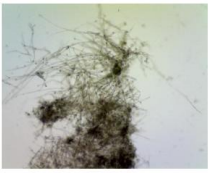
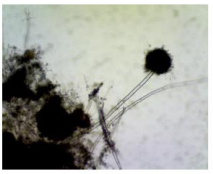
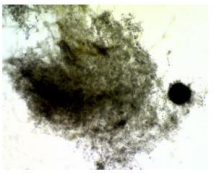
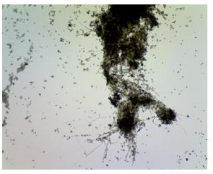
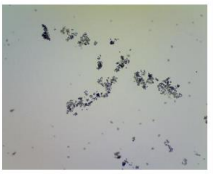
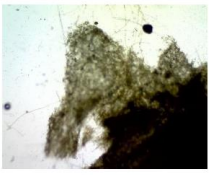
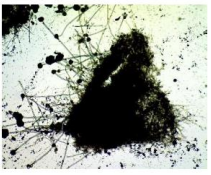
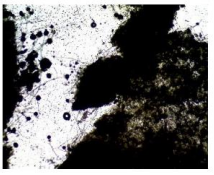
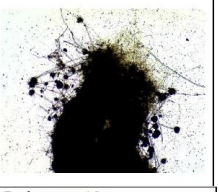
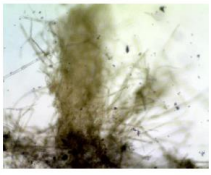
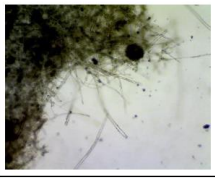
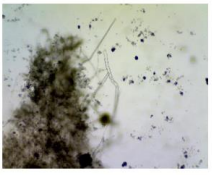
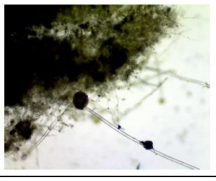
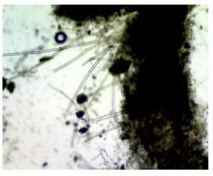
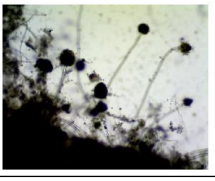
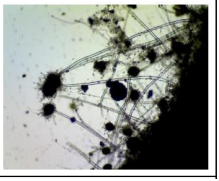
K (+)	Perbesaran 4x 	Perbesaran 4x 	Perbesaran 4x 	Perbesaran 4x 
	Perbesaran 10x  	Perbesaran 10x  	Perbesaran 10x  	Perbesaran 10x  
K (-)	Perbesaran 4x 	Perbesaran 4x 	Perbesaran 4x 	Perbesaran 4x 
	Perbesaran 10x  	Perbesaran 10x  	Perbesaran 10x  	Perbesaran 10x  

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	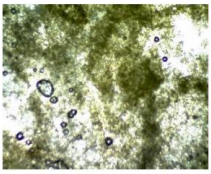	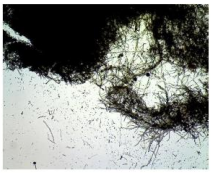	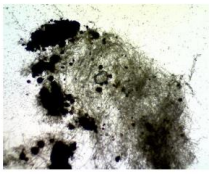	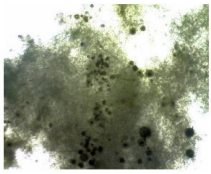
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	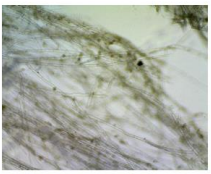	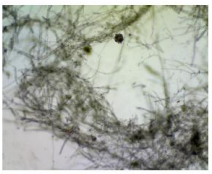	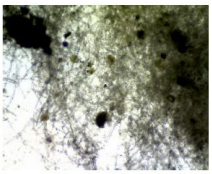	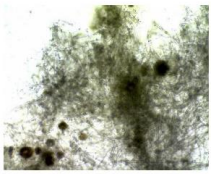
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	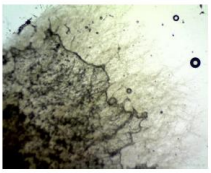	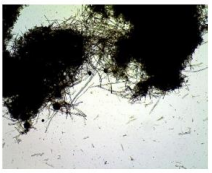	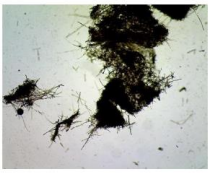	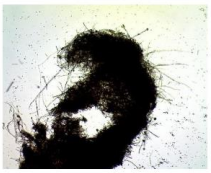
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	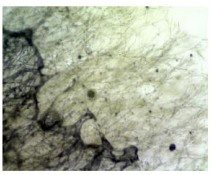	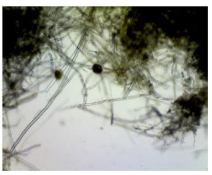	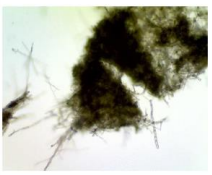	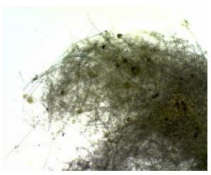
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	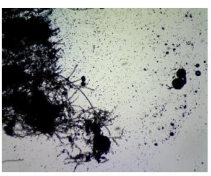	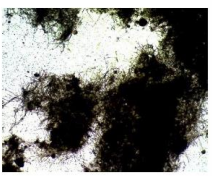	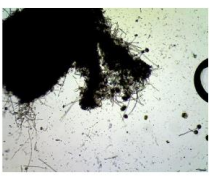	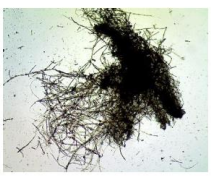
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		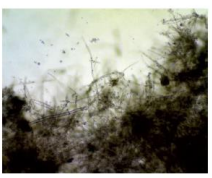	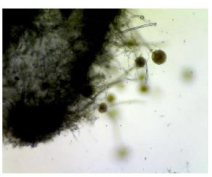	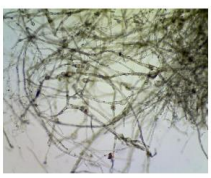

4 Conclusion

The creation of this innovative floor cleaning fluid formula is said to be successful because a formula has been obtained with the lowest nanosilver addition, namely 20 ppm, which is able to provide an antibacterial effect close to that of conventional floor cleaners. The concentration of nanosilver in this selected formula is used as the basis for making commercial floor cleaning liquid products. In making the formula, it was found that the nanosilver concentration of 20 ppm had the same activity as conventional floor cleaners. Innovative floor cleaning fluid contains 20 ppm nanosilver providing an antimicrobial effect twice as strong as floor cleaners without nanosilver. Thus, it can be concluded that the best formula with the most effective antimicrobial activity is the 20 ppm nanosilver formula.

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