CHARACTERIZATION OF *STAPHYLOCOCCUS AUREUS* BACTERIA IN *EARPHONES* THAT ARE OFTEN USED AMONG TEENAGERS IN SUB-DISTRICTS NORTHERN CITY OF GORONTALO CITY

Ratna Hasan[1)],Yolan Dunggio[2)], Laras Puspita Thaib[3)]
[1,2,3)]Bina Mandiri University Gorontalo
Email: ratnahasan09@gmail.com, yolandunggio01@gmail.com, laraspuspita2121@gmail.com

ABSTRACT

The problem that often occurs with *earphones* among teenagers is due to the phenomenon of playing *online games* and the disease caused is chronic noise. This study aims to characterize *Staphyloccus aureus* bacteria in *earphones* that are often used among adolescents and observe the types of bacteria in *earphones* that are often used among adolescents in Kota Utara District, Gorontalo City. This research method is qualitative with a descriptive type of research. *Accidental* sampling technique with 8 *earphones* that are often used. The results showed that from 8 earphone samples , there were 5 positive samples *of Staphylococcus aureus* and 3 samples in the form of bacillus that were gram-negative. In this study, the results of macroscopic examination, microscopic examination and catalase test were obtained using *Blood agar* media and *Mannitol salt agar* (MSA) media.

Keywords: Staphylococcus aureus *bacteria*, *Earphones*, Teenagers

INTRODUCTION

Earphones are used to hear and speak while communicating. With the advancement of technology, *earphones* are now more often used to listen to music because they are small, practical, affordable, and sound better than speakers. Its use is increasing, especially among adolescents [1]. The use of *earphones* among teenagers is increasing due to the rise of online games. Wearing *earphones* while playing games can cause noise, which has an impact on hearing loss. Prolonged use can lead to chronic noise exposure, reducing hearing sensitivity. [2] Prolonged use of earphones at high volumes can damage ear hair cells due to increased oxygen requirements, which affect mitochondria and lysosomes. As a result, the cell can rupture and Reissner's membrane tears. In addition, noise also causes narrowing of blood vessels in the cochlea, damaging the organs of the Corti. [17]

More than 40 million people in the United States aged 20 to 69 experience hearing loss due to non-occupational noise exposure, according to the WHO. Globally, more than one billion adolescents are at risk of hearing loss due to the habit of listening to loud music for long periods of time, according to the WHOThe use of earphones can increase the risk of hearing loss because the sound source is closer to the ear. A 2015 study in India found that 36.06% of students who used earphones experienced NIHL. On the other hand, a study in Indonesia by Rumampuk et al. (2018) found that 26.7% of students experienced mild deafness and 6.7% experienced moderate deafness. [17]

Submit: Octoberl 29th, 2024 Accepted: Dec 14th, 2024 Published: Dec 20th 2024

Indonesia ranks 4th in the world in terms of hearing loss and deafness, with the prevalence of hearing loss in Southeast Asia reaching 16.8%, with a deafness of 0.4%. Chronic Suppurative Media Otitis (OMSK) is one of the five causes of deafness that can be prevented and treated, according to the Decree of the Minister of Health No. 768/Menkes/SK/VII/2007, congenital deafness, deafness due to aging, noise exposure, and cerumen buildup.(Novita et al., 2015). In Indonesia, there were 440 cases recorded at the THTKL BLU RSUP Polyclinic Prof. Dr. R. D. Kandou Manado, Otteritis Externa at the ENT Polyclinic of H. Adam Malik Hospital Medan reported 867 cases in 2000 (Mandalahi, 2023). At RSUD M.M. Dunda Limboto, Gorontalo, in 2021, the most cases of otitis externa occurred at the age of 17 to 25 years and 36 to 45 years, with the main complaint being ear pain.

Regular use of earphones can increase the number of bacteria in the ear. If the earphones are worn continuously, the temperature and humidity of the ear canal will increase, creating an ideal environment for bacterial growth. In addition, earphones that are not cleaned properly can give rise to colonies of microorganisms that enter the ear canal. Sharing earphones with others can also spread bacteria between individuals. [3]

The use of earphones inserted directly into the ear canal is known to increase the risk of ear infections. This is because earphones can block the ear airways, which can trigger various types of common ear infections. In addition, there is an added risk because earphones are often shared by many people. In this situation, the chances of spreading ear infections between individuals become higher. Bacteria and germs from different people's ears can stick to the surface of the earphones and quickly spread through shared use. In addition, earphones coated with rubber or soft sponges can host many microorganisms, which can get into the ear canal during use. The external auditory canal usually has a lot of commensal bacteria, most of which are nonpathogenic and aerobic.. [3]

Anthony Van Leeuwenhoek discovered bacteria in 1684 and studied it in bacteriology. They are unicellular, prokaryotic, microscopic organisms and lack chlorophyll, with the term "bacteria" derived from *"bacterium."* [14] Bacteria are made up of hundreds of thousands of species, making them the most dominant organisms on Earth, found in soil, air, water, and living things, affected by pH, temperature, salt levels, and nutrients. [14].

Staphylococcus aureus is a gram-positive bacterium that is spherical in shape with a diameter of 0.7–1.2 μm and usually clusters in irregular clusters that resemble clusters of grapes. These bacteria are anaerobic and do not form spores. The bacteria grow best at 37°C, but can also form color at room temperature 20°C–25°C. With colors ranging from gray to golden yellow, the colony is round, smooth, prominent, and shiny. Staphylococcus aureus has a similar shape to a polysaccharide capsule or thin membrane in more than 90% of clinical isolates, both of these forms play an important role in their virulence rate [4]. *Staphylococcus aureus* is a spherical gram-positive bacterium measuring 0.7–1.2 μm that grows in irregular clusters. It is insoluble in

water, does not form spores, and can survive a variety of conditions, such as temperatures of 6.5–46 °C and pH 4.2–9.3 Solid media of gray to golden yellow have colonies that look round and shiny [11]. The bacterial growth medium must meet the nutritional needs of the bacteria so that they can grow and be studied. To grow Staphylococcus aureus, the agar mannitol salt (MSA) is a unique and selective medium. MSA only favors the growth of bacteria that can tolerate salt levels, especially gram-positive bacteria, as their high salt content (NaCl) ranges from 7.5 to 10 percent [9]

A type of bacteria that often lives in the ear**.** *Pseudomonas aeruginosa* is a rod-shaped bacterium that is aerobic and Gram-negative. These bacteria can be found in environments such as soil, plants, and mammalian tissues, and are able to survive in water and in medical equipment thanks to flagella [20]. *Pseudomonas aeruginosa* is a bacterium that can cause ear infections [5] Pseudomonas aeruginosa is the most common bacterium with a prevalence of about 18-67%. These bacteria have the ability to compete with other bacteria in the mucosa or skin, as they do not need many nutrients and can produce an antibacterial substance called *bacteriocin.* [2]

Staphylococcus aureus is the bacteria that most often causes infections. This type of bacteria can cause a variety of ear diseases, including skin infections around the ear and otitis externa. Ear canal infections are often triggered by *Staphylococcus aureus* because moisture in the ear can support its growth. [7]

Earphones are a tool used to listen to sounds from communication devices or computers. During this pandemic, advances in audio-visual and telecommunication technology forced communication and educational interactions using communication tools, computers, and other audio devices, leading to an increase in the current use of earphones. [8]

Benefits of *Earphones.* The use of earphones provides a number of advantages and benefits for their users. Many people choose to communicate through earphones because the sound produced is clearer than just using the speakers of communication devices or computers. In addition, there are various other advantages of using earphones, such as the ease of carrying and placing anywhere, the ability to adjust the sound volume, and providing privacy for users. Many people want to listen to music and communicate clearly and loudly without disturbing others.

The effect of earphone use in increasing bacteria in the ears**.** The effect of earphone use can significantly alert bacteria to ligament. This is because when *earphones* are used continuously, *the earphones* will increase the temperature and humidity of the ear canal. This makes it an ideal environment for bacteria to grow. The use of *earphones* inserted directly into the ear canal has been shown to affect the balance of natural bacteria present in the human ear. The human ear has a relatively sterile environment, with the presence of a balanced presence of bacteria that help maintain ear health. However, when *earphones* are used regularly and especially if they are used by more than one individual, bacteria present on the surface of the *earphones* can easily move into the ear canal. This happens because when the

earphones are inserted into the ear canal, the surface of the *earphone* can touch the walls of the ear canal, which can be a medium for bacteria to stick and multiply. Especially if the *earphones* are used by a variety of individuals, the bacteria from the ears of those people can spread quickly to the surface of the *earphones* and then to the ears of the individuals who use the *earphones*. In addition, long-term use of *earphones* can also lead to increased humidity inside the ear canal, creating a more ideal environment for bacterial growth. High humidity can promote the growth of bacteria and fungi inside the ear, which in turn can increase the risk of ear infections. [12]

The Influence of Earphone Use Among Teenagers**.** The use of earphones among active users is very high, but this does not always have a positive impact on health. Excessive use can degrade hearing quality and even lead to deafness. High volume of sound can cause permanent hearing damage, affect brain function, and risk irritation to the ear canal. The habit of using earphones can cause symptoms of external ear disorders, such as pain, itching, and discharge due to changes in temperature, humidity, and friction. [8]. Earphone use with hearing loss**.** According to Pandi, exposure to sound with an intensity of 120 dB for 1 to 4 hours can produce hearing loss, which has the potential to damage hair cells, blood vessels, afferent fibers, and buffer cells at various levels. Meanwhile, noise exposure that is considered safe is a maximum of 8 hours a day or 40 hours a week with an intensity not exceeding 85 dB. [10]

Laboratory Examination On earphones, Staphylococcus aureus bacteria are examined through macroscopic methods, microscopic, and catalase tests. Macroscopic examination**.** Macroscopic examination of *Mannitol Salt Agar* (MSA) media by observing the colony morphology after using the streak plate method. Colony observation includes the shape, size, and color of the colony. Each bacteria is observed under *the colony counter.* [13]

Microscopic examination**.** Microscopic examination is carried out by looking at the results of Gram staining to determine the shape and type of gram-positive and negative bacteria. Catalase test**.** The Catalase test aims to confirm whether microorganisms can break down H_2O_2 into oxygen. The test was carried out by rubbing the glass of the object and adding 2 drops of H_2O_2 3%. The formation of gas bubbles as a result of the destruction of H2O2 by the catalase enzyme showed positive results (Lindawati and Suardana, 2016). An enzyme that breaks down hydrogen peroxide into H_2O or O_2 catalase, a toxic substance that can inactivate cell enzymes. [16]

RESEARCH METHODS

Research Approach and Type. Research Approach. This research approach uses a qualitative approach, in which the researcher objectively observes the subjective reality being studied. This subjectivity is related to how reality is seen from the perspective of the respondents, especially regarding the characterization of St. *aphylococcus aureus* bacteria in earphones that are often used by adolescents in Kota Utara District, Gorontalo. Type and Design of Research,

This type of research is descriptive with the design of characterization *of Staphylococcus aureus bacteria* in earphones used by adolescents in the North City of Gorontalo.

Location and Time of the Researcher's Research Location. Sample selection is carried out. on Jalan KH. Adam Zakaria, North Kota District, and the examination was carried out at the Bina Mandiri University Gorontalo Laboratory. Research Period The research will start from June to July 2024.

Types and Data Sources. Type of Data, Qualitative data is used in this study. in the form of the presence or absence of contaminant bacteria in earphones that are often used among teenagers in the North City of Gorontalo City

Data Source. Primary data used by the research in obtaining data is primary data, namely data obtained from the results of examinations carried out as a result of the characterization of *Staphyloccus aureus* bacteria in *earphones* which are often used among adolescents in the North Kota sub-district of Gorontalo City. Secondary data were obtained from the relevant research literature

Data Collection Methods. In terms of methods, data were collected through laboratory examinations and observations. Data is obtained to find the truth regarding the problem at hand., Observation To collect data directly, this research observation pays attention to the object using all the senses. Interview. An interview is a data collection technique conducted through an intended conversation between two or more people. In this process, researchers ask questions, evaluate the answers given, ask for additional explanations, record information, and dig into further questions to gain a deeper understanding.

Documentation. The information obtained from interviews and observations is complemented by evidence of this research. Documentation is a data collection technique that is carried out by studying information that has been recorded. Pre-Analytical Laboratory Examination. Preparation of Tools and Materials: The tools and materials in this research include: *incubator, autoclave,* LAF (*laminal air flow*), aluminum foil, measuring cup, magnetic stirer bar, *hotplate*, analytical balance, watch glass, test tube, test tube shelf, microscope, pipette, measuring spoon, inoculation needle, small tube*, petri dish,* funnel, preparat, bunsen, marker, aquades, *Blood Agar, Mannitol Salt Agar* (MSA), crystal violet, *alcohol*, Nacl, *iodine,* safranin, ethanol 90%, mersi oil, *hydrogen Peroxide 3%.* Sampling: Samples were taken *from erphones,* sterile cotton swabs were applied to erphones*,* then the swabs were put in a container containing NaCl and samples were taken on the use of *earphones* in adolescents aged 16-19 years. Making Blood Agar Media, Weighing *Blood Agar* as much as 4.8 grams is put into 120 ml of aquadest, then simmered on a *hotplate* at a temperature of 260$^{\circ C}$ for 20 minutes, After being heated in *a hotplate* sterilized in an *autoclave*, Blood *Agar* Media which has been boiled is poured into a petri dish of 15 mL each, wait for the *Blood agar* medium to be solid, after it is solidly planted on the medium, the manufacture *of Mannitol Salt Agar* (MSA) media, weighing *Mannitol*

Salt Agar (MSA) as much as 13.32 grams put into 120 ml aquadest, then boil on a *hotplate* with a temperature 260◦C for 20 minutes, After heating in a *hotplate* sterilized in an *autoclav.* The boiled *Mannitol Salt Agar* (MSA) medium is poured into a petri dish of 15 mL each. Wait for *the Mannitol Salt Agar* (MSA) medium to be solid, after it is solid, inoculated.

Analysis, Bacterial Inocnation, Bacterial inoculation using the *streak plate* method (Line method) on *Mannitol Salt Agar* (MSA) media, After inoculating on bacterial planting media then incubated for 24 hours, Observations were made to see bacterial species on *earphones*, Gram Coloring, Drip Nacl 1 drop into the preparation then take the colony on *the Mannitol Salt Agar* (MSA) medium fixation on the preparate, Apus preparation is dripped first with dye with crystal violet for 1 minute, then rinse with water, Iodine 1 drop for 1 minute, then rinse with water, Then drip 90% ethanol for 10 seconds then rinse with water, Next, the preparation is dripped 1 drop of safranin for 45 seconds, the color is then discarded and cleaned with water, dried and observed microscopically. Catalise Test, Prepare with the equipment and materials to be used, Prepare 3 % H2O2 reagent, sterilize the preparation and ose using bunsen fire, Then drip 3% H202 on the preparation as much as 1 drop, Then mix 3% H202 with colonies on MSA media, See the changes that occur.

Post-Analytical, Macroscopically, macroscopic observations use colony morphology, including color, margins, and elevation after media incubation.

Microscopically, gram staining results are used to make microscopic observations. to identify the type of bacteria and their cell shape. Biochemical Test, Catalase test aims to determine whether microorganisms can break down H_{2O2} into oxygen. The process is carried out by rubbing microorganisms on top of the object glass, then dripping 1 drop of $_{H2O2}$ 3%. If gas bubbles appear from the degradation of $_{H2O2}$, the test result is considered positive.

RESEARCH RESULTS

The results of research in the Microbiology laboratory of Bina Mandiri University Gorontalo regarding macroscopic tests *of Staphylococcus aureus* on earphones were carried out using Blood Agar and Mannitol Salt Agar (MSA) media, as shown in this table.

Table 4.1 Macroscopic Results of *Earphone* Samples on *Blood Agar Media*

Sample Code	Incubation Period	Characteristics of colonies in *Blood Agar medium*	Information
PE 1	1 x 24 hours	Round, irregular, yellowish	Positfs
PE 2	1 x 24 hours	Round, irregular, white	Negative
PE 3	1x 24 hours	Round, irregular, yellow	Positfs
PE 4	1 x 24 hours	Round, irregular, yellow	Positive
PE 5	1 x 24 hours	Round, irregular, white	Negative
PE 6	1 x 24 hours	Round, irregular, yellow	Positfs
PE 7	1 x 24 hours	Round, irregular, white	Negative
PE 8	1 x 24 hours	Round, irregular, yellow	Positfs

Description: PE (*Erphone User*) Source: *Primary Data, 2024*

Based on Table 4.1, the results of the research at the Microbiology laboratory of Bina Mandiri University Gorontalo there were 8 samples *of earphones* used by teenagers on JL K.H ADAM JAKARIA, the results of macroscopic research showed that it was suspected that there were several

samples of *earphones* containing *Staphylococcus aureus* bacteria grown on *Blood Aagar* media. In *the Blood agar* medium, colonies grow in irregular rounds, yellow and white.

The results of the macroscopic examination can be seen in the following table:

Table 4.2 Sample Macroscopic Results *Earphone* At *Media Mannitol Salt Agar* (MSA)

Sample Code	Incubation Period	Characteristics of Colonies on *Mannitol Salt Agar Media*	Information
PE 1	1 x 24 hours	Irregular Round, Yellowish-White	Positive
PE 2	1 x 24 hours	Round, irregular, reddish-white	Negative
PE 3	1x 24 hours	Round, irregular, yellowish-white	Positive
PE 4	1 x 24 hours	Round, irregular, yellow	Positive
PE 5	1 x 24 hours	Round, irregular, reddish-white	Negative
PE 6	1 x 24 hours	Round, irregular, yellow	Positive
PE 7	1 x 24 hours	Round, irregular, reddish-white	Negative
PE 8	1 x 24 hours	Round, irregular, yellow	Positive

Description: PE (*Erphone User*) Source: *Primary Data, 2024*

Based on Table 4.2, the results of the research in the Microbiology laboratory of Bina Mandiri University Gorontalo there are 8 samples *of earphones* used by teenagers on JL K.H ADAM JAKARIA the results of macroscopic research show that there are several samples of *earphones* that are suspected to be *Staphylococcus aureus* bacteria grown on MSA media. In MSA media, colonies grow in an irregular round, yellowish-white shape. Colonies on MSA media are distinguished based on the bacteria that grow reddish-white, irregular and atypical.

Table 4.2 obtained the results of the research in the Microbiology laboratory of Bina Mandiri University Gorontalo there are 8 samples *of earphones* used by teenagers on JL K.H ADAM ZAKARIA. The results of microscopic research on gram staining showed that the bacteria were suspected to be *Staphylococcus aureus* bacteria because they were round (*cocus*), purple in color which indicated that the bacteria were included in the gram-positive category and some samples had a red rod shape (*bacilli*) included in gram-negative bacteria.

1. Catalase Test

Based on the results of research conducted in the Microbiology Laboratory of Bina Mandiri University Gorontalo, the results of the catalase test can be seen in the following table:

Table 4.4 Catalase Test Results on *Erphone*

Sample Code	Catalase Test Results	Information
PE 1	There are gas bubbles	Positive
PE 2	No gas bubbles	Negative
PE 3	There are gas bubbles	Positive
PE 4	There are gas bubbles	Positive
PE 5	No gas bubbles	Negative
PE 6	There are gas bubbles	Positfs
PE 7	No gas bubbles	Negative
PE 8	There are gas bubbles	Positive

Description: PE (*Erphone User*) *Primary Data 2024*

Based on the results of Table 4.3, the results of research in the Microbiology laboratory of Bina Mandiri University Gorontalo there are 8 samples *of earphones* used by teenagers who are located on JL K.H ADAM ZAKARIA as a result of biochemical tests (catalase test)

obtained the results of PE 1 samples there are gas bubbles, PE 3 there are gas bubbles, PE 4 there are gas bubbles, PE 6 there are gas bubbles, and PE 8 there are gas bubbles. The results showed that the presence of *Staphylococcus aureus* bacteria was characterized by the formation of gas bubbles and PE 2, PE 5, PE 7 samples did not contain gas bubbles.

DISCUSSION

Earphones are tools used to hear and speak when communicating using other devices. However, excessive use of earphones can lead to the growth of bacteria in the ears. If *the earphones* are used continuously, the temperature and humidity of the ear canal will increase this becoming an ideal environment for bacteria to grow. The use of *earphones* that are not cleaned properly can cause colonies of microorganisms that can enter the ear canal, in addition to sharing *earphones* with others can spread bacteria between humans. [3]

In a study conducted on adolescents who were in JL. K.H ADAM ZAKARIA. The results of the interview respondents used *earphones* for more than 3-4 hours per day, then respondents used a type of *rubber-capped earphone* so that it could accommodate bacteria in the ears, some respondents had difficulty hearing and itching in the ears, respondents had bad habits such as not cleaning *the earphones* and respondents often shared earphones with Others can spread bacteria between humans. So that the results of the study showed that there were gram-negative bacteria and *Staphylococcus aureus bacteria* in the *earphones.* Supported by research conducted by Gompa, H, S.S and K.H, Anand in 2019 in India precisely at *Saveetha Medical College* about the incidence of bacterial flora related to *earphones* used among students of *Saveetha Medical College and hospital, Chennai Tamilnadu.* Based on the results of the research, *Staphylococcus aureus* bacteria and *Pseudomonas aeruginosa* bacteria were obtained.Common bacteria that reside in the ear are *Staphylococcus aureus* and *Pseudomonas aeruginosa.*

In a study conducted at the Microbiology Laboratory of Bina Mandiri University Gorontalo, *Staphylococcus aureus* bacteria were found in *earphones* which are often used among adolescents by conducting macroscopic examinations, microscopic examinations and catalase tests. In this study, a sampling method was used with a swab technique on *earphones* that are often used among teenagers, then the sample was lowered in the laboratory and an examination was carried out using *Blood Agar* medium for planting samples after the bacteria grew, followed by *Mannitol Salt Agar* (MSA) medium for scratching, then incubated for 24 hours after which it was seen at the *coloni counter.*

In the *Blood Agar medium* that was examined at *the coloni counter*, the results were suspected to be bacteria in PE 1 in the form of irregular rounds, yellowish, PE 2 irregular rounds, white, PE 3 irregular rounds, yellow, PE 4 irregular rounds, yellow, PE 5 irregular rounds, white, PE 6 irregular rounds, yellow, PE 7 irregular rounds, white, and PE 8 is irregularly round, yellow.

In the *Mannitol Salt Agar (*MSA*) media* that was examined at the *coloni*

counter, the results of 5 yellow round MSA media were obtained. It is suspected to be *Staphylococcus aureus* bacteria and in 3 pink MSA media can be identified as not *Staphylococcus aureus bacteria.* Macroscopic examination of *Mannitol Salt Agar* (MSA) media was carried out by examining the morphology of colonies that emerged after using the plate streak method. The results of a study conducted by Sadulo Nurhayati, 2023 in Gorontalo on the identification *of Staphylococcus aureus* bacteria on closed and unclosed toothbrushes. Based on the results of the study, there are several samples of toothbrushes with and without caps grown on MSA media. The bacterial growth medium must meet the nutritional needs so that the bacteria can grow and the growth properties can be studied. Mannitol Salt Agar (MSA) is a selective and differential medium for the Staphylococcus group, which contains salt (NaCl) with a high concentration of 7.5%-10%, so it only supports bacteria that are tolerant of high salt. [11]

In this study, it was continued for microscopic examination (gram staining) for the purpose of gram staining to determine the morphology of bacteria. The bacteria Staphylococcus aureus gram positive, or cocus, is spherical in shape and produces purple gram staining because it retains the main color of purple, crystal violet. The main cause of purple color is the thicker peptidoglycan of gram-negative bacteria. when using 90% ethanol during staining [1]. After gram staining, there are two types of bacterial cells. Gram-negative bacteria in the form of rods (*bacilli*) and gram-positive bacteria in the shape of sphericals (*cocus*) which can be suspected to be *Staphylococcus aureus* bacteria in *earphones*. The bacteria that most often infect is *Staphyloccus aureus bacteria.* It is a type of bacteria that can cause various diseases of the ear such as skin infections around the ears and otitis ecterna. Ear canal infections are often caused by *Staphylococcus aureus* bacteria because moisture in the ear can cause *Staphylococcus aureus* bacteria to grow [20]

In this study, a catalase test was carried out to prove that the bacteria identified belonged to the Staphylococcus aureus species. The results showed that there were 5 positive preparations for Staphylococcus aureus, characterized by the appearance of gas bubbles, while the other 3 preparations were negative, because there were no gas bubbles. These findings are in line with research conducted by Sadulo Nurhayati in 2023 in Gorontalo, which focused on identifying Staphylococcus aureus bacteria in closed and uncovered toothbrushes. From the results of the study, several samples were found to contain Staphylococcus aureus bacteria, which is evidenced by the formation of gas bubbles. *Staphylococcus aureus* is differentiated by using a catalase test. and *Streptococcus sp***.** by dripping H2O2 over the glass object and mixing the inoculum from MSA. Gas bubbles (O2) showed positive results [18] For teenagers who often use *earphones*, they can keep the earphones clean, *earphone* users cannot share *earphones* with others because they can spread bacteria between humans, *Earphone* users cannot use *earphones* For a long period of time with a high volume because it can

cause noise, the temperature and humidity of the ear canal will increase, this becomes an ideal environment for bacteria to grow.

CONCLUSION

This study can show the presence of *Staphylococcus aureus bacteria* contamination in the use of *earphones* that are often used among adolescents in the North City of Gorontalo City. This study used 8 earphone samples to obtain macroscopic examination results suspected that there were several earphone samples containing *Staphylococcus aureus bacteria,* in microscopic examination it was suspected that there were several earphone samples containing *Staphylococcus aureus* bacteria, and examination of the catalase test suspected that some samples contained Staphylococcus aureus. This is characterized by the presence of gas bubbles in the preparation. The results of the study are suspected to have 5 earphone samples suspected to show the presence of *Staphylococcus aureus* bacteria and 3 earphone samples excluding *Staphylococcus aureus bacteria.*

BIBLIOGRAPHY

[1] Bhumbla, U. (2018) "Gram's Staining," in *Workbook for Practical Microbiology*. doi:10.5005/jp/books/14206

[2] Darmawan, A. B., & Anjarwati, D. U. (2012). *Differences in the sensitivity of antibiotic ear drops to Pseudomonas aeruginosa in chronic suppurative media otitis. Oto Rhino Laryngologica Indonesiana*, *42*(2), 77–82. https://doi.org/10.32637/orli.v42i2.22

[3] El Magrahi, H., Ben Ashur, A., Elkammoshi, A., Elgani, M., & Zriba, W. (2020). Prevalence of Bacterial Flora Associated with Earphones Used Among Students of University of Tripoli, Libya. Khalij-Libya Journal of Dental and Medical Research, 5(1), 6–10. https://doi.org/10.47705/kjdmr.215102

[4] Febriansah, R. E., & Meiliza, D. R. (2020). Course Textbook. In Umsida Press Sidoarjo University (Vol. 1, Issue 1).

[5] Gompa, 1. Harshini Sree Sai, & K.H, 2Dr. Anand. (2019). No Title. Incidence of Bacterial Flora Associated with Earphones Used Among Students of Saveetha Medical College and Hospital, Chennai, Tamilnadu, *4*(10). https://ijisrt.com/assets/upload/files/IJISRT19OCT1868.pdf

[6] KD, A. M., & Iriani, D. et al. (2020). *EAR, NOSE AND THROAT HEALTH.* https://eprints2.undip.ac.id/id/eprint/17010

[7] Lindawati, S.A. and W. Suardana. 2016. *Isolation and Identification of Lattice Acid Bacteria Species Producing Amtimicrobial Compounds from Balinese Cattle Coloning*, Veterinary Journal, 17(4): 576-6581.

[8] Nadifa, A., Rofii, A., Noor, Z., Illiandri, O., & Marisa, D. (2022). *The Relationship between Earphone Use and the Degree of Ear Itching Complaints*. *Homeostasis*, *5*(2), 247. https://doi.org/10.20527/ht.v5i2.6268

[9] Nocera, F.P., Ferrara, G., Scandura, E., Ambrosio, M., Fiorito, F., andMartino, L.D. (2022). *A Preliminary Study on Antimicrobial Susceptibility of Staphylococcus spp. And Enterococcus spp. Grown on Mannitol Salt Agar in European Wild Boar (Sus scrofa) Hunted in Campania Region—Italy*. Animals, 12(1), 1-12

[10] Novita, I., Mulyati, D., & Rahayu, S. (2015). *The Relationship between Ear Hearing Aid Use Behavior and Hearing Loss in Students of the Medical Education Study Program*. *Lentera*, *15*(13), 23–28.

[11] Novitasari, T.M. (2019). *The Potential of Jengki Anchovy (Stolephorus indicus) as an Alternative Material for the Growth of Staphylococcus aureus Bacteria.*

[12] Oey, S. (2022). *Here are the differences between Headphones, Headsets, Earphones, Handsfree, and Earbuds*. Https://Www.Ruparupa.Com/. https://www.ruparupa.com/blog/perbedaan-headphone-headset-earphone-handsfree-dan-earbuds/

[13] Pranoto, E., Fauzi, G., Hingdri. 2014. *Isolation and Characterization of Endophyt Bacteria on Highland Productif and Young Tea Plant (Camellia Sinensis (L.)* O. Kuntze). Biospecies,7 (1): 1-7..

[14] Riskiana, N. A., Nasution, N. F., & Dona, R. A. (2020). *Learning Student Biology on Bacterial Material in Class X of SMA Negeri 1 Batang Onang. Journal of Edugenesis*, *2*(2), 8–14. https://journal.ipts.ac.id/index.php/BIOESA/article/view/1992

[15] Rosita, B. (2019). *The Use of Earphones in Listening to Noisy Music among Millennials. Sebelas Maret University, Surakarta*, 1–5.

[16] Susanti., Awari, Periadnadi, and Nurmiati. 2017. *Isolation and Characterization of Natural Bacteria Digesting Siamese Catfish (Pangasius hypophthalmus) as Probiotic Candidates,* Journal of Metamorphosis, 4(2): 247-255.

[17] Susiyati, E., & Imanto, M. (2020). *The Effect of Earphone Use as a Risk Factor for Noise Induced Hearing Loss. Majority*, *9*(2), 63–67. https://juke.kedokteran.unila.ac.id/index.php/majority/article/viewFile/2848/2781

[18] Toelle, N.N., Lenda, V. 2014. *Identification and Characteristics of Staphylococcus Sp. and*

[19] *Streptococcus Sp. from Ovarian Infection In Commercial Laying Hens.* J. Animal Science, 1(7), 32-37

[20] Tuon, F. F., Dantas, L. R., Suss, P. H., & Tasca Ribeiro, V. S. (2022). *Pathogenesis of the Pseudomonas aeruginosa Biofilm*: A Review. *Pathogens, 11*(3). https://doi.org/10.3390/pathogens11030300