

Bapidara: Between Myth, Medical, and Mathematics

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Abstract. This study aims to examine the bapidara treatment activities and their relationship with myth, medical, and mathematics. The research method used is exploration with an ethnographic approach. The results showed that there were at least three mathematical concepts obtained from bapidara activities, namely symbols, algorithms, and symmetry. The symbol obtained is a symbol of addition, subtraction, and dot that is applied to certain parts of the patient's skin. The algorithm that emerges from this traditional medicine is very systematic in following the rules of the right-left and front-back, so it helps traditional doctors to avoid mistakes in the procession. The results of this smear are a type of folding symmetry, with the imaginary vertical line is from the patient's head to between his legs. From the medical side, turmeric used in the procession does have efficacy as an antipyretic, but it must be orally and not topically. The main content of lime betel has nothing to do with fever.

Keywords: *Bapidara*, Ethnomathematics, Local Wisdom, Traditional Medicine, Fever

1. Introduction

Ethnomathematics is a study firstly introduced in 1970. It was a new perspective in mathematics education that considered the relationship between mathematics education and the cultural, political, social and economic forces that could change the world (D'Ambrósio & Knijnik, 2020). People Education, which was developed in Latin America in the early 1960s, was one of the sources of the field of study. An expert named Paulo Freire who introduced the idea in Brazil and the "inland" country explained that the politics of education, justice, and equality also needed to be applied in mathematics education (Powell & Frankenstein, 1997). An educator from Brazil, Urbiratan D' Ambrosio, greatly influenced Freire's idea about education (Higginson, 1997). D'Ambrosio had been known across the countries as an expert who brought the idea of Ethnomathematics and developed the very conceptual foundation of ethnomathematics itself.

D'Ambrosio (2006) considered ethnomathematics to be a research program. This means that the focus of ethno-mathematics is broader than simply recognizing mathematical ideas and practices from various cultural groups. Although ethnomathematics from various cultural groups is the main source of this research program, still the main purpose of the ethnomathematics is to offer a broader view of human knowledge and habits through the overview of how groups, communities, and citizens struggle in environmental contexts, cultural, economic and social.

The ethnomathematics is inspired by such ideas and ways of doing mathematics that remind us of western mathematics as the mathematics that we have known so far is a form of the west. Although the discussion in mathematics is basically related to space, time, grouping, and comparison in accordance to human nature, the ways and techniques to convey and communicate the results of reflection is still very contextual and not necessarily suitable for other countries (D'Ambrósio & Knijnik, 2020).

Ethnomathematics introduces itself as opposed to ethnocentric theory and opposes the assessment of society and culture based on certain cultural standards and accepts many adjustments based on the perspective of cultural relativity. After that, to reduce ethnocentric biases and to emphasize cultural descriptions based on the perspective of internal compatibility, ethnomathematics cut itself off from the

position. So, the term ethnomathematics means that the study of mathematics from cultural groups, which emphasizes on internal compatibility. It tries to describe the culture from the perspective of the culture in which it was formed so that values and codes will give specific meaning and then give meaning to mathematics itself and are described according to cultural logic. This activity is one of the focuses of ethnomathematics (D'Ambrósio & Knijnik, 2020).

In South Kalimantan, there is a traditional medical practice that is still believed by the community to be effective in treating fever problems, namely *bapidara*. This treatment is one of the local wisdoms of the community and is related to ethnomathematics because there are certain signs or patterns that must be applied to the patient's body to get healed.

Bapidara is often done by the mother or family if her child has a fever. The practice is not only carried out by the mother or family from a low level of education but also a high level of education. It is done by those from poor families to rich families, maybe even done by mothers or family with a health education background.

South Kalimantan is one of the provinces comprises of several ethnics or ethnic groups and customs. Ethnic groups in the province include the Banjar tribe as much as 76.34%, Madura tribe as much as 1.22%, Dayak Meratus as much as 1.20% and other tribes as much as 21.24%. The knowledge on traditional medicine is part of culture that has been passed on from one generation to another.

Traditional medicine is medicine that comes from knowledge, skills, and practices based on theories, beliefs, and experiences of different cultural customs and is used to maintain health and prevent, diagnose, treat illness or mental illness (WHO, 2013). Traditional medicine based on local wisdom can improve the standard of living, both economically and health of the local community. If the community could utilize the traditional medicine appropriately and properly, then people's access to treatment when experiencing health problems will be easier because it is adjusted to the ability of the region or local to deal with health problems (Anggeriyane, 2019).

Local wisdom is a form of environmental wisdom that exists in community life in a place or region (Situmorang & Harianja, 2014). Meanwhile, the local wisdom related to health serves a good purpose for Indonesian people, each ethnic has different characteristics of their own local wisdoms (Lesmana et al., 2018).

Local wisdom in the health sector by people of South Kalimantan is called *batatamba* which can be interpreted as a "healing process" (Jamalie, 2011). Those who perform *batatamba* are called *panamba*, and one of the healing practices of *panamba* is *bapidara*, a ritual done to heal any illness and to help a patient to return to health. Being healthy is a condition where someone can do any daily activities (Astutik et al., 2016). *Bapidara* is originated from the word *pidara* which means that the ritual is performed to expel the spirits that cause pain to the patient, so that *bapidara* is *pidara* with additional prefix of *ba* which means to do the exorcism through rituals (Megawati, 2014).

2. Method

Judging from its relation to Cultural Anthropology, the main difficulty faced by ethnomathematics is the difficulty of understanding and interpreting other cultures through categories and analysis of instruments that do not originate from that culture. In addition, most ethnomathematics research also uses ethnographic techniques such as using participant observation, sound recordings, field notes, and interviews. Although ethnographic mathematics research is not exactly the same as ethnography, at least it has similarities on how data is collected (D'Ambrósio & Knijnik, 2020).

The method used in this study is exploration with an ethnographic approach. Exploration method is a method used to search for, explore, and find symptoms or phenomena by directly observing the phenomenon (Gulo, 2000; Prahmana, 2017). By applying the ethnographic approach, researchers injecting themselves into the community and experience the daily life themselves (Spradley, 2006). The research is conducted in Desa Pakan Dalam, Daha Utara sub-district, Hulu Sungai Selatan district, Kalimantan Selatan, Indonesia.

Historically, Daha Utara sub-district, which is also called Negara, was once the home of a Hindu kingdom called the Kingdom of the Negara Daha and was the forerunner to the Banjar sultanate. The Negara Daha Kingdom was a continuation of the Negara Dipa Kingdom which was in Amuntai. The

relocation of this capital city is to avoid disaster because the Amuntai was considered to have lost its fortune.

The focus of this study is the ethnomathematics of the traditional medication of *bapidara* which has been practiced for many generations and believed to heal fever. In addition, this study also analyzes the effect of treatment in relation to the myth and medic. To obtain a comprehensive and valid data, data collection was divided into two, interviews and observations.

Interviews were conducted with one of the traditional doctors in Pakan Dalam village, and observations were conducted to observe the healing activities of *bapidara* by the traditional doctor. Once the data were obtained, the researchers would analyze if there were any mathematics systems implied in the practice, be it intentionally or not.

3. Result and Discussion

Result

The focus of this study is the traditional practice of *bapidara*. This traditional medicine is believed to cure specific fever caused by ancestral spirits. These ancestral spirits are parents, grandparents, or *datu* (parents of grandparents) who have died. According to the traditional doctor's explanation, the ancestors tried to communicate to the patients by calling them, but the patient could not hear the call so the spirits of the ancestors became angry and the prospective patient finally got a fever.

Patients suffering from this specific fever show some symptoms such as rising body temperature and cold ears, palms, and soles of feet. In addition, the patients experience pain in their stomach and their eyes go deeper inside. The traditional doctor interviewed stated that he could only help patients that display those symptoms above. Usually, the parents of patients who come to traditional doctors have previously tried to treat their children to general practitioners but there has been no progress, so this traditional medicine is their alternative. From this finding, the community in general still retains trust in traditional doctors because they can successfully cure their child's fever. Although most of the cases happen to children and babies, there are also some adults who experience this illness and traditional doctors are still believed by people to help them.



Figure 1: Curcumin Mixed with Lime Above Parang

Before performing the ritual of *bapidara*, the traditional doctor needs to prepare some tools and ingredient, such as *parapi* (a type of incense), turmeric, lime and *parang* (a type of knife that has a large cross section and is made of iron). After the *parapi* has been ignited and a pinch of turmeric is shredded, *parang* is placed on the *parapi* (as in roasting) horizontally and the broad cross-section of *parang* is used for mixing lime with turmeric. The mixing process cannot be done recklessly. A pinch of lime must be applied to *parang* by forming a plus sign (+) and then the shredded turmeric is placed carefully on top of the lime. Then, the lime and the turmeric are mixed manually by using hands while the traditional doctor starts reciting some prayer. The doctor said that the prayer recited during the ritual are not some mantras or alike but a prayer in Arabic, *basmallah* (*bismillaa hirrohmaa nirrohiim*). During the ritual, the doctor will try to reach the ancestral spirits to apologize on behalf of the patient. The unique part here is that the traditional doctor knows the family names of patients who have died.

That is why the traditional doctor must come from the same village as the patient and is usually the traditional doctor already around 50s.

This *bapidara* ritual has a lot to do with mathematics. The traditional doctor will apply the mixture of lime and turmeric earlier on the patient's skin. Starting from the face, on the forehead and ears, the doctor will slowly put to the patient's forehead two (-) marks on the right and the left side. They are placed right above each eyebrow. Then, the doctor applies the mixture on the patient's ear, specifically behind the lower ear (where women usually put earrings), right and left. It is only a dot (like a dot or dot multiplication). After that, the mixture of lime with turmeric will be applied to the shoulders, elbows, and folds, up to the palms, starting from the right side of the body. All parts were smeared to form a plus sign called *cacak burung* (bird trail / footprint) by following the segment of the arm.

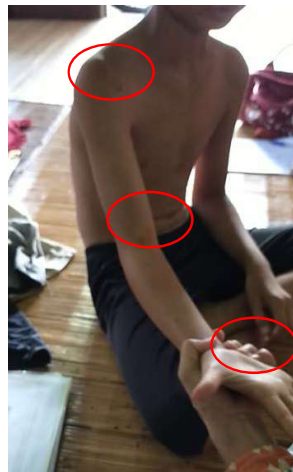


Figure 2: Applying Mixture on Hand

On the patient's legs, the mixture is applied on the knee, knee folds, and soles of the feet in a sequence from the right then the left with the plus sign pattern (+) according to the leg segment. For body parts, the plus sign (+) is shaped from the bottom of the neck to the lower abdomen for vertical lines, then from the right abdomen to the left for horizontal lines. Before moving to the back of the body, each dot is given above the right and left chests. The back of the body is the last part. The pattern of plus (+) is also shaped by applying the mixture of lime and turmeric, start from the bottom of the neck to the waist according to the vertebrae for the vertical line, while the horizontal line from the top of the waist right to the left. The back is also given a dot under the right and left shoulder.

Discussion

There are at least three things of *bapidara* ritual that are related to formal mathematics. The first is the plus sign (+), minus (-), and dot (.) that traditional doctors use when applying the mixture of turmeric and lime onto the patient's body. Scribbles are always in balanced, for example the right and the left lines of the plus sign (+) are on the same length, as well as the top and bottom lines. There are exactly 16 plus signs (+) formed by traditional doctors, two minus signs (-), and six dots (.). There is no specific reason behind this numbers, but the traditional doctor explained that it is important to pay attention to every part of the body and make sure it is well marked so that the patient could be cured.

The second link between traditional ritual of *bapidara* and mathematics is the algorithm. The arrangement of this algorithm is in a very systematic sequence with the rules of the front back and left and right. The treatment should follow specific rules; the mixture of turmeric and lime is applied on the right side first before the left side and it starts on the forehead, ears, chest, hands (shoulders and palms), soles of the feet, and back shoulders. Some parts such as elbow, knees and torso should be in sequence of front and back. This algorithm is useful for traditional doctors to remember which parts must be applied because they follow a certain arrangement. The knowledge about this treatment is passed on

from one generation to the next generation. The traditional doctors learn the technique by watching their predecessors performing the same treatment.

Third, this treatment is related to the mathematics rules of the right and left algorithms which is the algorithms of symmetry, specifically the folding symmetry. If you imagine that the patient's body has an imaginary line that divides it vertically in half from the middle of the forehead to between his legs, then it means that the traditional doctor draws a folding symmetry of the imaginary line. This shows that even though traditional doctors do not specifically make symmetry patterns, but, in practice, they have drawn very symmetrical patterns. In fact, the traditional doctor emphasized on the importance of drawing the patterns symmetrically otherwise the treatment will not work.

Further, the prayer recited by the traditional doctor during *bapidara* treatment has to do with fetishes. The term fetish comes from the Portuguese *fetico* which means artificial. The Portuguese term is also derived from Latin, *fasticius*, which means artificial, or made up, which initially used to imitate through signs, ornaments, and cosmetics. In its use, fetishism is defined as supernatural traits, magical powers and charms contained in objects. Fetishism can be divided into three types; anthropological fetishism, sexual fetishism, and commodity fetishism (Megawati, 2014). Anthropological fetishism is a belief that every object is inhabited by certain powers, such as a belief that statues, amulets, and rajahs should be worshiped as they have magical powers. Meanwhile, sexual fetishism is the phenomenon of the use of certain body objects such as underwear, hair, and handkerchiefs to obtain sexual satisfaction. While commodity fetishism can be interpreted as something that not only has a use value but also contains the power of a certain charm and gives a certain status to the people who use it.

The phenomenon of fetishism in Islamic culture, in one context, is related to objects worshipped because it is inhabited by a spirit. In other contexts, the holy book (Al-Qur'an), along with the power of its words, is also used as an object of worship, overlooking its spiritual contents and messages. The book is ripped off its spiritual messages and believed to have a mystical power of its own. The words spoken or written (in the form of sheets, spells, miniatures and tattoo) can emit such a magical power, which can be realized into various influences, both good and bad influences, to cure illness or kill people. In this case, the function of words as communication medium has been shifted to a realization function, from the representation function to the presentation function.

In Indonesian society, the use of these fetish objects has become a historical part of Indonesian Islamic culture which appears in various mediums and power, and is used in various contexts of rituals, ceremonies and even in everyday life. There are many examples of fetishism practice in South Kalimantan. In *bapidara*, for example, the word *basmallah* is recited as part of the ritual to cure a fever because it is believed that the cause of one's illness is a supernatural being. It is in contrary to the real meaning of *Basmallah*, which is as a reminder for Muslims that every time they start something, they must remember God who has a loving and compassionate nature.

From the medical side, turmeric has indeed been used by Indonesians for generations because in addition to being a spice in the kitchen, turmeric (curcuma) also has medicinal properties which are antiseptic, disinfectant, anti-inflammatory, and natural analgesics, even often used to treat digestive, intestinal problems and irritable wounds (Verma et al., 2018). However, turmeric is useful as a medicine if it is taken orally and not just smeared, especially if it is mixed with lime which is the result of limestone or limestone deposition and is not recommended for use on the face area because the substance in lime is quite hot (Ermadayanti, 2018). The use of turmeric as an antipyretic (heat-reducing) is widely prescribed orally by mixing it with plants or other ingredients but there has been no explanation on the use of turmeric with lime used topically (Anggeriyane, 2019). Lime has the chemical formula CaCO_3 so that the main content of lime is calcium. Calcium is an important mineral for humans, especially bone formation. Lime is used as a medicine along with other ingredients as the remedy for coughs and colds, swollen gums, boils, menstrual problems, and insect bites (Nurnabila, 2011).

Antipyretic effect on turmeric comes from the curcumin which is anti-inflammatory (Khalandar et al., 2018; Matthew, 2013). Curcumin can be used as an anti-inflammatory agent and specifically as an antipyretic because it inhibits the production of PGE2 induced by Lipopolysaccharides (LPS) on macrophage cells by inhibiting the change of arachidonic acid into PGE2. This is done by Siklooksigenase-2 (COX-2). A decrease in PGE2 will cause a decrease in the hypothalamus set point

so that the body will carry out the mechanism of reducing body temperature so that it returns to normal (Ashraf & Sultan, 2017).

4. Conclusion and Suggestion

Bapidara is a traditional treatment that has been part of the culture in South Kalimantan. The practice can still be found today. People still believe that this ritual can cure the fever. This ritual is carried out by mixing lime with turmeric and roasting it on *parapin* using a *parang* as the medium. The mixture is then applied to the patient's body, from head to toe by writing minus (-), plus (+), and dot (.) with certain algorithms so that the mixture becomes symmetrical on the patient's body. Medically, turmeric can be used as a heat-lowering drug (antipyretic), but its use is only orally, and lime used in *bapidara* treatment rituals is widely used as medicine but has nothing to do with fever.

Studies related to its healing effect from the medical point of view are needed to examine if the mixture of ingredients used and the procedures for this treatment could really cure fever or it is just a placebo effect. In addition, the studies related to the type of fever that is specific to this traditional treatment -which is characterized by rising temperature but having cold ears, palms, and soles of the feet are cold, as well as experiencing discomfort in the stomach- are also needed. Further study about this type of fever and what medical measures can cure it is highly encouraged.

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