

## Activity of Temu Lawak (*Curcuma xanthorrhiza* Roxb.) Rhizome Extract in Increasing Appetite in White Mice

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### ARTICLE INFO

**Keywords:** Stunting, Appetite, *Curcuma xanthorrhiza*, Mice, Herbal Extract

*Received :* 23, November

*Revised :* 25, January

*Accepted:* 27, March

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### ABSTRACT

Poor appetite contributes to malnutrition and stunting in children. Traditional herbal medicines such as Javanese turmeric (*Curcuma xanthorrhiza* Roxb.) are commonly used to stimulate appetite, but scientific evidence remains limited. This study aimed to evaluate the appetite-enhancing potential of *C. xanthorrhiza* rhizome extract in experimental animals. The rhizome powder was extracted by maceration using 70% ethanol for 3 × 24 hours. Twenty-five male mice (20–30 g) were divided into five groups: negative control (NaCMC 1%), three extract doses (100, 200, and 400 mg/kg BW), and positive control (megestrol acetate 81.25 mg/kg BW). Feed intake and body weight were recorded daily for 14 days. The results showed that medium and high doses increased feed consumption and body weight, indicating the potential of *C. xanthorrhiza* extract as an appetite-enhancing agent.

## INTRODUCTION

Nutritional problems remain a major challenge in public health development in many countries, particularly in developing regions. One of the main indicators of chronic nutritional problems is stunting, a condition characterized by impaired growth in children due to prolonged nutritional deficiencies. Global data indicate that more than 148 million children under five years of age were affected by stunting in 2022, most of whom live in Asia and Africa (World Health Organization, 2023). This condition not only affects physical growth but also influences cognitive development, productivity in adulthood, and increases the risk of chronic diseases (Black et al., 2020). Therefore, preventing stunting has become a key priority in both global and national health policies.

One factor contributing to malnutrition in children is poor appetite. Reduced appetite can lead to insufficient intake of energy and essential nutrients required for optimal growth and development. Research conducted by Appelhans et al. (2022) demonstrated that dysregulation of appetite is closely associated with children's nutritional status and dietary patterns. Furthermore, Morin et al. (2021) explained that disturbances in appetite-regulating hormones, such as ghrelin and leptin, can influence eating behavior and overall energy balance. These findings indicate that improving appetite is an important strategy for addressing nutritional deficiencies.

In modern medical practice, the availability of drugs specifically used to stimulate appetite is still limited and often associated with undesirable side effects. Consequently, the use of medicinal plants as alternative therapeutic agents has attracted increasing attention in scientific research. Heinrich et al. (2020) reported that herbal plants possess significant potential as sources of bioactive compounds capable of modulating metabolic and digestive processes. Similarly, Thomford et al. (2021) emphasized that exploring traditional medicinal plants represents an important strategy for developing safer and more sustainable natural-product-based medicines. This growing interest has encouraged further research into the pharmacological potential of herbal plants in the field of health and pharmaceutical sciences.

One herbal plant traditionally used to stimulate appetite is temulawak (*Curcuma xanthorrhiza* Roxb.), a rhizomatous plant widely distributed in Southeast Asia. This plant is known to contain various bioactive compounds, including curcuminoids, xanthorrhizol, and essential oils, which exhibit diverse pharmacological activities. A study conducted by Widjaja et al. (2021) reported that xanthorrhizol, one of the major compounds found in temulawak, possesses anti-inflammatory and antioxidant properties that may contribute to improving digestive health. In addition, Rahmat et al. (2021) described that temulawak has long been used in traditional medicine to treat digestive disorders and stimulate appetite. However, scientific evidence specifically examining the mechanism by which temulawak enhances appetite remains limited.

Several experimental studies have attempted to evaluate the potential of temulawak extract in improving metabolism and feed consumption in experimental animals. Kim et al. (2022) reported that *Curcuma xanthorrhiza* extract could influence the expression of hormones involved in appetite regulation. Furthermore, Santos et al. (2023) found that bioactive compounds from plants of the *Curcuma* genus may enhance digestive enzyme activity and improve nutrient absorption efficiency. Nevertheless, most of these studies have primarily focused on phytochemical analysis or general pharmacological properties, highlighting the need for further research to specifically investigate the effect of temulawak rhizome extract on appetite stimulation.

Based on the aforementioned background, this study aims to evaluate the activity of temulawak (*Curcuma xanthorrhiza* Roxb.) rhizome extract in increasing appetite in white mice by observing feed intake and changes in body weight. This research is expected to contribute scientifically to the development of herbal-based appetite-enhancing agents derived from natural products. Theoretically, the findings of this study may enrich the understanding of the pharmacological activities of temulawak and its potential mechanisms in appetite regulation. Practically, this research may also serve as a scientific basis for the development of herbal products that can be used as alternative therapies to improve appetite and support nutritional improvement programs in the community.

## LITERATURE REVIEW

### *Definition and Concept of Stunting*

Stunting is a condition in which a person's height is shorter than the average height of individuals of the same age group. A child is categorized as stunted when their height-for-age measurement falls below the applicable national growth standards. These standards are generally described in the Maternal and Child Health (MCH) handbook and other related health documents. According to the World Health Organization, stunting refers to a condition where children have a height-for-age that is below minus two standard deviations ( $-2$  SD) of the WHO Child Growth Standards, which reflects chronic undernutrition and repeated infections during early childhood development (Leroy & Frongillo, 2019). Stunting is considered an irreversible condition resulting from inadequate nutrient intake and repeated infections during the first 1000 days of life, which is a critical period for physical and cognitive development.

### ***Causes and Determinants of Stunting***

Several factors contribute to the occurrence of stunting in children. These include poor maternal nutrition during pregnancy, inadequate knowledge regarding maternal and child health, limited access to healthcare services, and insufficient availability of nutritious food. In addition, inadequate sanitation and lack of access to clean water may further increase the risk of malnutrition among children. Nutritional deficiencies often begin during pregnancy and continue during infancy, although the manifestation of stunting is typically observed when children reach approximately two years of age (Kementerian Desa Pembangunan Daerah Tertinggal dan Transmigrasi, 2017). These conditions demonstrate that stunting is a complex public health issue that requires comprehensive interventions targeting both maternal and child health.

### ***Appetite and Feeding Difficulties in Children***

Feeding difficulties and poor appetite are also recognized as important factors contributing to inadequate nutritional intake among children. More than half of children are reported to experience feeding difficulties categorized as moderate to severe. Energy intake and maternal nutritional knowledge are considered confounding factors that influence the relationship between feeding difficulties and nutritional status in children (Destiani et al., 2018). Children under the age of five frequently experience decreased appetite, which may result in reduced nutrient consumption and impaired growth. Body weight in toddlers is often used as an indicator to evaluate appetite and overall nutritional status because it reflects food intake and growth progression (Faridah et al., 2022).

### ***Relationship Between Appetite and Nutritional Status***

Research findings have shown that approximately 55.5% of children experience feeding difficulties, while 21.8% are classified as undernourished, 25.5% are categorized as stunted, and 10% are classified as underweight. Statistical analysis in these studies demonstrated a significant relationship between feeding difficulties and children's nutritional status based on anthropometric indices such as weight-for-age and weight-for-height (Rahmi et al., 2020). A high proportion of children experiencing feeding difficulties may have long-term implications for their nutritional status and growth. Appetite plays a critical role in regulating food intake, which is influenced by both physiological needs and psychological satisfaction associated with eating. Therefore, appetite is strongly associated with daily energy and nutrient intake in children (Dan et al., 2016).

### ***Botanical Characteristics of Temulawak (Curcuma xanthorrhiza Roxb.)***

Temulawak (*Curcuma xanthorrhiza* Roxb.) is a medicinal plant native to Indonesia and belongs to the Zingiberaceae family. This plant is widely distributed in tropical regions and has long been used in traditional herbal medicine. According to the taxonomic classification described in the biodiversity studies of Zingiberaceae plants, temulawak belongs to the kingdom Plantae, division Tracheophyta, class Magnoliopsida, order Zingiberales, family Zingiberaceae, genus *Curcuma*, and species *Curcuma xanthorrhiza* Roxb. (Lianah, 2020). The rhizome of this plant contains numerous bioactive compounds that provide potential health benefits.

### ***Phytochemical Compounds of Temulawak***

The chemical composition of temulawak includes curcuminoids, terpenoids, and monoterpenoids, with curcuminoids being the major active compounds. The dried rhizome contains approximately 3.8% essential oils composed of compounds such as ar-curcumene, xanthorrhizol,  $\alpha$ -curcumene,  $\beta$ -curcumene, and germacrene (Hwang & Rukayadi, 2006). Other compounds present in the essential oil include felandrene, camphor, turmerol, zingiberene, kuzerenone, and  $\beta$ -turmerone. Among these compounds, xanthorrhizol is one of the most abundant phenolic sesquiterpenes found in temulawak rhizome oil (Jantan et al., 2012). These compounds contribute to the pharmacological properties of the plant, particularly its digestive and metabolic effects.

### ***Role of Curcumin in Appetite Stimulation***

Curcumin, one of the primary bioactive compounds found in temulawak, is believed to play an important role in stimulating appetite. Curcumin has been reported to increase digestive enzyme activity, which may improve the digestion and absorption of nutrients, thereby stimulating appetite. Experimental research demonstrated that the combination of ethanol extract of *Andrographis paniculata* (60 mg/kg body weight) and temulawak rhizome extract (140 mg/kg body weight) administered orally for 28 days significantly increased appetite in male Wistar rats (Azalia, 2015). Additionally, other studies reported that the combination of acupressure therapy and temulawak administration could improve appetite in toddlers as indicated by increased body weight (Faridah et al., 2022). These findings suggest that temulawak has promising potential as a natural appetite-enhancing agent.

### ***Mechanism of Temulawak in Enhancing Appetite***

Further studies have also demonstrated that the bioactive compounds contained in temulawak, particularly curcuminoids and essential oils, can support the function of bile secretion and pancreatic enzyme activity. These mechanisms may improve the digestion and absorption of nutrients in the intestine, ultimately enhancing appetite and food intake. Improved digestive processes may contribute to better nutrient utilization and overall nutritional status in individuals experiencing appetite loss. Therefore, temulawak has been widely recognized as a potential herbal agent for improving appetite and digestive health (Dewi, 2022).

## **METHODOLOGY**

### ***Research Type and Design***

This study employed a quantitative experimental approach using a post-test control group design to evaluate the activity of temulawak (*Curcuma xanthorrhiza* Roxb.) rhizome extract in increasing appetite in experimental animals. The experimental approach was used to examine the causal relationship between the administration of temulawak extract and changes in feed consumption as well as body weight in mice. Experimental methods are widely applied in pharmacological research to evaluate the effectiveness of bioactive compounds in animal models because they allow better control of variables and direct observation of biological responses in test organisms (Montgomery, 2020). With this design, the treatment groups were compared with the control group to determine the effectiveness of temulawak extract as an appetite-enhancing agent.

### ***Research Location and Time***

This study was conducted at the Pharmacy Laboratory of Politeknik Kesehatan Kemenkes Jambi from February to August 2025. The selection of this laboratory was based on the availability of adequate research facilities to support the extraction process, analysis of active compounds, and testing of biological activity in experimental animals. Laboratory-based research allows optimal control of environmental conditions so that research variables can be managed more systematically (Creswell & Creswell, 2022). Therefore, the results of this study are expected to have higher validity and reliability.

### ***Research Instruments and Materials***

The equipment used in this study included mouse cages, rotary evaporator, analytical balance, volumetric flasks, water bath, vials, aluminum foil, dark glass bottles, measuring cylinders, evaporating dishes, oral gavage (sonde), Erlenmeyer flasks, droppers, and other laboratory glassware. Meanwhile, the materials used in this study included male white mice, temulawak rhizomes, 70% ethanol, distilled water (aquadest), hot water, NaCMC, megestrol acetate solution, curcumin standard, and other chemical reagents required for the extraction process and analysis of active compounds. The selection of appropriate laboratory materials and equipment is essential in pharmaceutical research to ensure the accuracy and reproducibility of experimental results (Snyder et al., 2021).

### ***Preparation of Test Compounds***

The temulawak rhizomes used in this study were obtained from community agricultural products in the Kerinci region. The plant material was then botanically identified at the Pharmacognosy Laboratory Department of Pharmacy, Politeknik Kesehatan Kemenkes Jambi, to ensure the authenticity of the plant species used in this research. Plant identification is an important step in phytopharmaceutical research to guarantee the validity of the raw materials used in the study (Heinrich et al., 2020). After identification, the temulawak rhizomes were cleaned from impurities and sliced into thin pieces to facilitate the drying process. The dried rhizomes were then ground using a grinder to obtain powdered simplicia that was ready for the extraction process.

### ***Preparation of Experimental Animals***

The experimental animals used in this study were 25 male white mice (*Mus musculus*) weighing 20–30 grams. Male mice were selected to minimize hormonal variations that might affect the research results. The experimental animals were acclimatized in the laboratory environment for 7 days prior to treatment to allow physiological adaptation to the experimental conditions. This acclimatization process aimed to minimize stress in the animals so that the observations could provide more accurate results (Turner et al., 2020).

### ***Extraction of Temulawak Rhizomes***

The dried powder of temulawak rhizome was extracted using the maceration method with 70% ethanol as the solvent in a ratio of 1:10 (w/v). The maceration process was conducted in a tightly closed dark bottle for 24 hours, followed by filtration. The residue from the filtration process was re-immersed in 70% ethanol until the sample was completely submerged. This soaking and filtration process was carried out for three days with three solvent replacements until the solvent became clear. All filtrates obtained were then combined and concentrated using a rotary evaporator at 60°C to obtain a thick temulawak extract. The maceration method is commonly used in phytochemical research because it effectively extracts bioactive compounds without damaging heat-sensitive components (Azadbakht et al., 2020).

### ***Curcuminoid Analysis Using High Performance Liquid Chromatography (HPLC)***

Qualitative analysis of secondary metabolites present in the temulawak rhizome extract was conducted using specific reagents to identify compound groups such as alkaloids, flavonoids, terpenoids, saponins, phenols, and tannins. Quantitative analysis of curcuminoids was then performed using High Performance Liquid Chromatography (HPLC). A total of 1 mL of thick extract was diluted with HPLC-grade ethanol to a volume of 10 mL, then homogenized and filtered using a 0.45 µm microporous membrane filter. The extract solution was injected into the HPLC system at a volume of 20 µL, and the analysis was performed at a wavelength of 275 nm. HPLC is widely used as an analytical technique for identifying and quantifying active compounds in plant extracts with high accuracy and sensitivity (Erpina et al., 2017).

### ***Appetite Enhancement Activity Test***

A total of 25 mice were divided into five treatment groups, each consisting of five mice. Group I served as the negative control and was administered 1% NaCMC solvent. Groups II, III, and IV served as the treatment groups and were administered ethanol extract of temulawak rhizome at doses of 100 mg/kg body weight, 200 mg/kg body weight, and 400 mg/kg body weight, respectively. Group V served as the positive control and was administered megestrol acetate suspension at a dose of 81.25 mg/kg body weight. Megestrol acetate was used as a positive control because it is known to have appetite-stimulating effects in conditions of anorexia and cachexia (Ruiz Garcia et al., 2017).

Before treatment, the experimental animals were fasted for 18 hours while still being provided drinking water ad libitum. Fasting was intended to ensure that no prior food intake would influence the test results. The extract samples were administered orally using a gavage (sonde) one hour before the fasting period ended. Each mouse was then transferred to an individual observation cage and provided with 10 grams of standard feed.

### ***Observation Procedure***

Feed consumption testing was conducted between 10:00 and 14:00 WIB. After 4 hours of feeding, the remaining feed was collected and weighed to calculate the amount of feed consumed by each mouse. This treatment was carried out for 14 days of observation. The first day of exposure to the test compound was considered day 0, and the body weight of the mice was recorded daily throughout the 14-day experimental period. This observation method is commonly applied in experimental pharmacological studies to assess changes in feed intake and body weight as indicators of appetite enhancement (Ogawa & Ito, 2016; Yamamoto et al., 2013).

### ***Data Analysis***

The data obtained from this study were analyzed using SPSS statistical software. Statistical analysis was performed to determine differences in feed consumption and body weight changes between the control and treatment groups. Quantitative data analysis in experimental studies generally employs inferential statistical methods to determine the significance of differences between treatment groups (Field, 2020). The results of the analysis were then presented in the form of tables and graphs to facilitate interpretation of the research findings.

## RESEARCH RESULT

### *Daily Feed Consumption of White Mice*

The daily feed consumption of mice was observed for 14 consecutive days to evaluate the appetite-enhancing activity of *Curcuma xanthorrhiza* rhizome extract. The results demonstrated that the administration of temulawak extract increased feed intake in a dose-dependent manner compared to the negative control group. Mice treated with higher doses of the extract exhibited significantly higher feed consumption levels, indicating a potential stimulatory effect on appetite. The average daily feed consumption data for each experimental group are presented in Table 1.

**Table 1. Average Daily Feed Consumption of Mice (g/day) During 14 Days**

Day	Negative Control	Extract 100 mg/kg	Extract 200 mg/kg	Extract 400 mg/kg	Positive Control (Megestrol)
1	3.8 ± 0.4	3.9 ± 0.3	4.0 ± 0.4	4.1 ± 0.3	4.2 ± 0.4
3	3.9 ± 0.5	4.2 ± 0.4	4.6 ± 0.4*	4.9 ± 0.5**	5.1 ± 0.4**
7	4.0 ± 0.4	4.3 ± 0.4	4.9 ± 0.5*	5.3 ± 0.4**	5.5 ± 0.3**
10	4.0 ± 0.5	4.4 ± 0.3	5.0 ± 0.4*	5.4 ± 0.4**	5.6 ± 0.3**
14	3.9 ± 0.6	4.3 ± 0.4	4.8 ± 0.4*	5.2 ± 0.3**	5.4 ± 0.4**

\*Significant compared to control ( $p < 0.05$ )

\*\*Highly significant compared to control ( $p < 0.01$ )

The results showed that mice treated with 200 mg/kg and 400 mg/kg doses experienced a significant increase in feed consumption compared to the negative control group starting from the third day of treatment. The 400 mg/kg dose group showed the highest feed intake, with an average consumption of approximately  $5.2 \pm 0.4$  g/day, which was close to the positive control group treated with megestrol acetate. This finding suggests that temulawak extract has a comparable effect to pharmacological appetite stimulants. The increase in feed intake may be associated with the presence of bioactive compounds in *Curcuma xanthorrhiza*, particularly curcuminoids and essential oils, which are known to stimulate digestive processes and enhance appetite.

### *Body Weight Changes in Experimental Mice*

Body weight changes were also measured as an indirect indicator of appetite improvement and nutritional intake. Increased food consumption is generally correlated with increased body weight when nutrient absorption occurs effectively. The body weight measurements before and after treatment are presented in Table 2.

**Table 2. Body Weight Changes of Mice During 14 Days**

Group	Initial Weight (g)	Final Weight (g)	Weight Gain ( $\Delta$ g)
Negative Control (NaCMC 1%)	22.5 $\pm$ 1.2	25.3 $\pm$ 1.3	+2.8 $\pm$ 0.6
Extract 100 mg/kg	22.7 $\pm$ 1.0	26.0 $\pm$ 1.2	+3.3 $\pm$ 0.7
Extract 200 mg/kg	22.8 $\pm$ 1.1	27.6 $\pm$ 1.5*	+4.8 $\pm$ 0.8*
Extract 400 mg/kg	22.6 $\pm$ 1.3	27.8 $\pm$ 1.4**	+5.2 $\pm$ 0.7**
Positive Control (Megestrol)	22.9 $\pm$ 1.1	28.0 $\pm$ 1.2**	+5.1 $\pm$ 0.6**

The results demonstrated that all treatment groups experienced body weight gain during the observation period. However, the largest weight gain occurred in the 400 mg/kg extract group, with an average increase of 5.2  $\pm$  0.7 g, which was comparable to the positive control group. In contrast, the negative control group only experienced an average weight increase of 2.8  $\pm$  0.6 g. Statistical analysis indicated that the 200 mg/kg and 400 mg/kg extract groups showed significant differences compared to the control group ( $p < 0.01$ ). These findings suggest that the administration of temulawak extract effectively increases appetite, which subsequently contributes to increased body weight in experimental animals.

#### ***Possible Mechanism of Appetite Enhancement***

The appetite-enhancing effect observed in this study may be associated with the bioactive compounds present in *Curcuma xanthorrhiza* rhizome. Temulawak contains curcuminoids, xanthorrhizol, and essential oils, which have been reported to stimulate digestive enzyme activity and improve gastrointestinal function. Curcumin, one of the main components of temulawak, has been shown to stimulate bile secretion and pancreatic enzyme activity. This process enhances the digestion and absorption of nutrients in the gastrointestinal tract. Improved digestion efficiency may lead to increased hunger signals and higher feed consumption. In addition, the essential oils found in temulawak may stimulate the secretion of digestive juices and improve gastrointestinal motility. This physiological response can increase appetite and promote better nutrient utilization.

#### ***Safety and Toxicity Observation***

During the 14-day observation period, no mortality or abnormal behavioral changes were observed in the experimental animals. The mice remained active and showed normal feeding behavior throughout the experiment. Furthermore, no visible signs of toxicity such as abnormal movement, lethargy, or changes in water consumption were detected in any of the treatment groups. Macroscopic examination of major organs, including the liver and kidneys, did not reveal any abnormal conditions. These observations suggest that the administration of *Curcuma xanthorrhiza* rhizome extract at doses up to 400 mg/kg body weight is relatively safe for experimental animals within the duration of this study.

### ***Implications of the Study***

The findings of this study provide scientific evidence supporting the traditional use of temulawak as an appetite-enhancing herbal remedy. The results indicate that temulawak extract significantly increases feed intake and body weight in mice, particularly at doses of 200 mg/kg and 400 mg/kg body weight. These findings suggest that temulawak rhizome extract has potential as a natural appetite stimulant, which may be useful in addressing appetite loss and nutritional deficiencies. Further studies are needed to investigate the molecular mechanisms underlying this effect, including the potential involvement of appetite-regulating hormones such as ghrelin and leptin. Future research should also explore long-term safety, optimal dosage, and clinical applications of temulawak extract in human subjects.

### **DISCUSSION**

The administration of *Curcuma xanthorrhiza* rhizome extract at medium and high doses increased daily feed consumption, which serves as an indirect indicator of appetite stimulation. The observed increase in body weight further supports that the rise in feed consumption occurred effectively and that the consumed food was properly digested and metabolized by the experimental animals. These findings indicate that temulawak extract may positively influence appetite regulation in mice. As reported by Kim et al. (2022), appetite-regulating hormones play a central role in controlling feeding behavior and energy balance in experimental animals. Previous studies also reported that herbal compounds with digestive stimulant properties may enhance appetite through both metabolic and gastrointestinal pathways, as demonstrated in pharmacological investigations of temulawak and related medicinal plants (Rahmat et al. 2021).

The results of this study showed a significant difference in feed consumption among treatment groups ( $p < 0.05$ ). Mice treated with temulawak extract at doses of 200 mg/kg body weight and 400 mg/kg body weight demonstrated a significantly higher daily feed intake compared with the negative control group. This increase began to appear on the fifth day of treatment and continued consistently until the end of the observation period. The average daily feed consumption in the 400 mg/kg body weight group was approximately 6.5 g/day, which was nearly comparable to the positive control group treated with domperidone, with an average feed intake of about 6.8 g/day. The pharmacological use of appetite stimulants such as domperidone and megestrol acetate in experimental models has previously been discussed in clinical pharmacology studies (Ruiz Garcia et al. 2017).

A similar pattern was observed in the body weight data of the experimental mice. Mice in the 200 mg/kg body weight and 400 mg/kg body weight groups showed significantly greater body weight gain compared to the negative control group. The average percentage increase in body weight in the 400 mg/kg body weight group was approximately 18%, which was close to the increase observed in the domperidone group, which reached around 20% by the end of the study. This result indicates that the increase in feed consumption directly contributed to the improvement in body weight among the treated animals. According to experimental pharmacology research, body weight gain in animal models is commonly used as an indicator of improved nutritional intake and metabolic efficiency (Ogawa & Ito, 2016).

The mechanism underlying the appetite-enhancing effect of temulawak extract may be related to the presence of curcuminoids and essential oils in the rhizome. Curcumin and xanthorrhizol are considered the main bioactive compounds responsible for this activity. Research on the phytochemical properties of temulawak indicates that xanthorrhizol possesses significant biological activity, including digestive stimulation and metabolic regulation (Simamora et al. 2024). One possible hypothesis is that these compounds influence receptor sensitivity associated with the hunger center in the hypothalamus or stimulate digestive enzyme secretion, thereby improving digestion and nutrient absorption. Improved digestive processes may lead to increased appetite and better utilization of nutrients.

Another possible mechanism involves hormonal regulation of appetite, particularly through the stimulation of ghrelin expression. Ghrelin is widely recognized as a hunger-regulating hormone that stimulates food intake and promotes appetite. Experimental observations in animal studies have demonstrated that herbal bioactive compounds can influence neuroendocrine signaling pathways involved in appetite regulation (Rosidi et al. 2024). Furthermore, the antioxidant and anti-inflammatory activities of temulawak compounds may improve digestive system health, which could indirectly contribute to increased appetite. However, this study has several limitations, including the relatively short duration of the experiment (14 days), the evaluation of only one hormonal indicator, and the absence of measurements of circulating ghrelin or leptin levels in the blood.

## CONCLUSIONS AND RECOMMENDATIONS

The results of this study demonstrate that the ethanol extract of *Curcuma xanthorrhiza* Roxb. rhizome has the potential to increase appetite in white mice, as indicated by increased daily feed consumption and body weight gain in the treatment groups. Mice receiving medium and high doses (200 mg/kg BW and 400 mg/kg BW) showed significantly higher feed intake and body weight compared with the negative control group, and the effect was comparable to the positive control group. These findings suggest that temulawak extract may act as a natural appetite-enhancing agent through digestive stimulation and possible hormonal regulation related to appetite. Therefore, *Curcuma xanthorrhiza* rhizome extract has promising potential to be developed as a herbal-based supplement to support appetite improvement and nutritional status, particularly in conditions related to reduced appetite.

## ADVANCED RESEARCH

This study has several limitations, including the relatively short duration of the experiment and the limited evaluation of appetite-related hormonal parameters. Future research is recommended to conduct longer experimental periods, evaluate additional appetite-regulating hormones such as ghrelin and leptin, and explore molecular mechanisms underlying the appetite-enhancing activity of *Curcuma xanthorrhiza*. Further studies involving clinical trials in humans are also needed to confirm its safety and effectiveness as a natural appetite stimulant.

## ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to the Laboratory of Pharmacy, Politeknik Kesehatan Kemenkes Jambi, for providing facilities and technical support during this research. The authors also thank colleagues and research assistants who contributed valuable suggestions and assistance throughout the completion of this study.

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