INTRODUCTION

Human memory is a complex cognitive function. It shapes our thought and behavior because information processing at one point in time influences processing at later points in time. Construction of memory consists of three separate stages: encoding, storage, and retrieval (Baddeley 1996). Encoding refers to initial processing of information that will potentially be stored as memory episodes. Storage maintains and consolidates information over extended period of time. Retrieval refers to process that results in remembering the encoded episodes. Both encoding and retrieval process occur in hippocampus and modulated by acetylcholine (Hasselmo 1999).

Based on its storage capacity, memory can be distinguished into two kinds. They are short-term and long-term memories. Short-term system has a limited capacity and memory traces can spontaneously fade within seconds. Long-term memory has a massive capacity and durability so the memories can be held for a long time. There are three kinds of long-term memory: episodic, semantic, and procedural memories. Episodic memory is a kind of memory that results from our past personal experiences. Semantic memory relates to general knowledge, such as geography and history. Procedural memory involves skill and habit.

A kind of short-term memory is called working memory. Working memory is a limited capacity system that holds items of information transiently in mind in the service of comprehension, thinking, and planning. It is assumed to be an integral part of human memory system. Working memory encompasses both storage and processing functions simultaneously, such as: imaging a sequence of chess moves, constructing a sentence, mental arithmetic, creation of music or poetry (Goldman 1996).

To perform cognitive task, brain requires large energy. Although brain weighs only 2% of total body weight, the brain uses about 20% of the total body’s energy. Commonly brain energy comes from aerobic glucose degradation. The brain’s energy storage is extremely small, so without glucose replacement, the brain would be depleted of glucose in less than 10 minutes. When someone sleeps, blood glucose concentration tends to decrease due to no food intake. By taking breakfast in the next morning, the glucose concentration will increase again. Breakfast consumption influences performance in memory tasks, especially one that requires the retention of new information (Benton 1998). Skipping breakfast leads to slower value of stimulus discrimination, increased error, and slower memory recall (Pollit 1998).

Moslem religious fasting is a situation where subject does not consume any food and water from dawn (± 4 AM in Indonesia) until sunset (± 6 PM) in the lunar calendar month of Ramadhan. Ramadhan fasting is compulsory for moslem people; however, for variety of reasons, many people in Indonesia habitually perform fasting every Monday and Thursday (MTFast) irrespective of the month. Fasting declines blood glucose concentration similar to skipping breakfast (Sunram-Lea 2001). It may influences performance in memory task due to metabolic changes in plasma glucose regulation in the brain. The MTFast therefore provides a model of how habitual fasting influences performance on memory task.

Objective

To investigate whether MTFast influences performance of working memory task or not.

Place and Time

Research was done from February until July 2006 at Laboratory of Zoology, Department of Biology, Faculty of Mathematics and Natural Sciences IPB.

MATERIAL AND METHODS

DMTS

Working memory involves, among others, spatial, phonological, and somatosensory components. Delayed Matching to Sample (DMTS) paradigm is a widely used method to study visuospatial working memory in human and animal. DMTS requires subject to hold a visual stimulus “on line” over a delay interval before choosing it again among other stimuli presented later on (Elliot 1999). There were two kinds of DMTS used in this research; simple and sequential DMTSs. Simple DMTS is a working memory task that has only one visual stimulus that must be remembered by subject. Present research used Simple DMTS for training session. Sequential DMTS has one to eight stimuli that should be remembered by subject. Also, the subject must follow the order of appearance of each stimulus. Sequential DMTS was used in actual working memory test.