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### **PROPOSED ENHANCEMENT IN CLOUD SECURITY**

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#### **ABSTRACT**

*Cloud computing is one of the today's most exciting technologies due to its ability to reduce costs associated with computing while increasing, flexibility and scalability for computer process. During the past few years, cloud computing has grown from a being a promising business idea to one of the fastest growing part of the IT industry, but the measure issues of the security. The boom in cloud computing has brought lots of security challenges for the consumers and service providers. The aim of the research is to identify the most vulnerable security threats in cloud computing, which will enable both end users and vendors to know about the key security threats associated with cloud computing and find out the benefits and drawbacks in regards with cost, data security and data availability.*

**Keywords:** Cloud Computing; Cloud Storage and Security

#### **INTRODUCTION**

“Jim Larus, Microsoft Research, Extreme Computing Group” is said the cloud will change everything. Cloud models are: Software as a Service (SaaS), in which the service provided to the user is in the form of an application that runs on a cloud infrastructure; Platform as a Service (PaaS), in which the user can deploy its own applications in the provider's infrastructure; and Infrastructure as a Service (IaaS), in which the user has access to the computational resources themselves, in the form of virtual machines, storage, networks and others.

#### **OBJECTIVE**

Data security is major issue for Cloud Computing. There are several other security challenges including security aspects of network and virtualization. This paper has highlighted all these issues of cloud computing security concern. Researcher believe that due to the complexity of the cloud, it will be difficult to achieve end-to-end security. Researcher hope their practical work will provide a better understanding of the design challenges of cloud computing security issues.

#### **Security Services**

Cloud computing such a service should aim to achieve the best of both worlds by providing the security of a private cloud and the functionality and cost savings of a public cloud.

**Confidentiality:** The cloud storage provider does not learn any information about customer data.

**Integrity:** any unauthorized modification of customer data by the cloud storage provider can be detected by the customer, while retaining the main benefits of a public storage service.

**Availability:** customer data is accessible from any machine and at all times.

**Reliability:** customer data is reliably backed up.

**Efficient retrieval:** data retrieval times are comparable to a public cloud storage service.

**Data sharing:** customers can share their data with trusted parties. An important aspect of a cryptographic storage service is that the security properties described above are achieved based on strong cryptographic guarantees as opposed to legal, physical and access control mechanisms.

Code implementation of the security purpose. In Current scenario the security is measure issues so these code helpful for resolve the security issues.

When the code is develop for the security purpose then the person can't copy of this website so the website is providing the security for the following manner.

### Suggestions

URL to be displayed of the server and entered by the user, however the URL of database access should be different. This can be implemented by server side scripting.

Implementation of the code is – Implementation of Suggestions (Primary Data)

### IMPLEMENTATION OF METHOD

Researcher has developed a method in an application. The web application allows download of notes on payment basis. At the time of authenticated user click on download link, which is displaying in **Action** Header of the table in the following figure, the notes starts downloading. While downloading, the URL displays in Address bar of the browser is not, where the physical files of notes are located. The application internally opens that location and start downloading file for the user.

The application is implemented successfully and put online. The user cannot know the location of physical files, and security becomes enhance.

To implement this following method is used:

Link of Download

```
<a href="my_download_file.php?id=f&f=<?php echo $filenm ?>">Download</a>
```

in “my\_download\_file.php”

```
header("location:download_file.php?f=http://www.securelocation.com/files/demo/docs/" .  
$_GET["f"]); header("location:main.php");
```

“download\_file.php” file contents following code:

```
<?php  
define('ALLOWED_REFERRER', '');  
define('BASE_DIR',getcwd());  
define('LOG_DOWNLOADS',true);  
define('LOG_FILE','downloads.log');  
$allowed_ext = array (  
    'zip' => 'application/zip',  
    'txt' => 'application/text',  
    'rtf' => 'application/rtf',  
    'pdf' => 'application/pdf',  
    'doc' => 'application/msword',
```

```
'xls' => 'application/vnd.ms-excel',
'ppt' => 'application/vnd.ms-powerpoint',
'exe' => 'application/octet-stream',
'gif' => 'image/gif',
'png' => 'image/png',
'jpg' => 'image/jpeg',
'jpeg' => 'image/jpeg',
'mp3' => 'audio/mpeg',
'wav' => 'audio/x-wav',
'mpeg' => 'video/mpeg',
'mpg' => 'video/mpeg',
'mpe' => 'video/mpeg',
'mov' => 'video/quicktime',
'avi' => 'video/x-msvideo'
);
if (ALLOWED_REFERRER !== "
&& (!isset($_SERVER['HTTP_REFERER']) ||
stripos (strtoupper($_SERVER['HTTP_REFERER']),strtoupper(ALLOWED_REFERRER)) === false)
)
{
die("Internal server error. Please contact system administrator.");
}
set_time_limit(0);
if (!isset($_GET['f']) || empty($_GET['f'])) {
die("Please specify file name for download.");
}
$name = basename($_GET['f']);
function find_file ($dirname, $name, &$file_path) {
    $dir = opendir($dirname);
    while ($file = readdir($dir)) {
        if (empty($file_path) && $file != '.' && $file != '..') {
            if (is_dir($dirname.'/'.$file)) {
                find_file($dirname.'/'.$file, $name, $file_path);
            }
        }
    }
}
else {
```

```
if (file_exists($dirname.'/'.$fname)) {
    $file_path = $dirname.'/'.$fname;
return;
    }
    }
    }
} // find_file
$file_path = "";
find_file(BASE_DIR, $fname, $file_path);
if (!is_file($file_path)) {
die("File does not exist. Make sure you specified correct file name.");
}
$fsize = filesize($file_path);

$fext = strtolower(substr(strrchr($fname, "."), 1));
if (!array_key_exists($fext, $allowed_ext)) {
die("Not allowed file type.");
}
if ($allowed_ext[$fext] == ") {
    $mtype = "";
if (function_exists('mime_content_type')) {
    $mtype = mime_content_type($file_path);
}
else if (function_exists('finfo_file')) {
    $finfo = finfo_open(FILEINFO_MIME); // return mime type
    $mtype = finfo_file($finfo, $file_path);
finfo_close($finfo);
}
if ($mtype == ") {
    $mtype = "application/force-download";
}
}
else
{
```

```
$mtype = $allowed_ext[$fext];
}
if (!isset($_GET['fc']) || empty($_GET['fc'])) {
    $asfname = $fname;
}
Else
{
    $asfname = str_replace(array("'",'"', '\\', '/'), "", $_GET['fc']);
if ($asfname === "") $asfname = 'NoName';
}
header("Pragma: public");
header("Expires: 0");
header("Cache-Control: must-revalidate, post-check=0, pre-check=0");
header("Cache-Control: public");
header("Content-Description: File Transfer");
header("Content-Type: $mtype");
header("Content-Disposition: attachment; filename=\"$asfname\"");
header("Content-Transfer-Encoding: binary");
header("Content-Length: " . $fsize);
$file = @fopen($file_path, "rb");
if ($file) {
    while(!feof($file)) {
        print(fread($file, 1024*8));
        flush();
        if (connection_status() != 0) {
            @fclose($file);
            die();
        }
    }
    @fclose($file);
}
if (!LOG_DOWNLOADS) die();
$f = @fopen(LOG_FILE, 'a+');
if ($f) {
    @fputs($f, date("m.d.Y g:ia")." ".$_SERVER['REMOTE_ADDR']." ".$fname."\n");
}
```

```
@fclose($f);
```

```
}
```

```
?>
```

### Description of Code

Above code will create a download link and when user will click on that, he/she will refer to my\_download\_file.php. In this file system will change the location download\_file.php, execute this with parameters of file name and its secured location, open a dialogue box to save file and then redirect to main.php file.

In this internal process, location of file kept secured.

### CONCLUSION

It is conclude that while Cloud computing technology can prove to be a great asset to companies, it could also cause harm if not understood and used properly. Researcher has considered Cloud computing to be an opportunity for small businesses to balance the efforts implied by IT management of course limited by the disadvantages of Cloud, some of them presented. The first and most important concern is given by security issues related to having their business data in the Cloud or, in a simpler way, having their data out on the Internet. Nevertheless, the recommendation would be to begin adopting Cloud Computing for a smaller part of their business applications in order to be able to count down the benefits and also to identify the risks. Cloud Computing offers benefits for organizations and individuals. There are also privacy and security concerns. If it is considering a cloud service, one should think about how personal information, and that of customers, can best be protected.

One of the biggest security worries with the cloud computing model is the sharing of resources. Cloud service providers need to inform their customers on the level of security that they provide on their cloud. In this paper, researcher has first discussed various models of cloud computing, security issues and research challenges in cloud computing.

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**THE EFFECT OF CREATINE SUPPLEMENTS ON  
SPRINTING PERFORMANCE OF MALE BEGINNER  
ATHLETES**

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**ABSTRACT**

*Nutritional aids are getting the preferences of many athletes. It is part of actions that are taken by athletes around the world to enhance their performance. Many studies conducted on creatine supplements used elite athletes as a subject. It's effect on the performance of male beginner athletes was untouched. In the present study, the effects of creatine supplements on sprinting performance of male beginner athletes were studied. Twenty male beginner athletes (EG, N=10) and (CG, N= 10) participated in resistance training for three months (3 days per week for 45 minutes). In a double blind placebo controlled study, the EG consumed 5 grams of creatine monohydrate every training session, while the CG used water. After 12 weeks of training and supplementation, the EG improved better in sprinting. In body weight, the CG increased by 2% and the EG increased by 6%. 3% and 6% enhancement in BMI were shown for the CG and EG, respectively. In girth measurements the EG improved better in muscle size. Upper arm circumferences were increased by 3% and 9% by CG and EG, respectively. In chest circumference, CG and EG showed 4% and 12% improvement, respectively. 2% and 6% improvements were observed in thigh circumference for CG and EG, respectively. The performance of the EG was boosted in 100m and 200m sprinting. The CG decreased the sprinting time by 3% while the EG reduced it by 10%. In 200m sprinting, the CG and EG showed 5% and 12% enhancement of sprinting speed, respectively. These results indicated that long-term creatine supplementation combined with resistance training promoted muscle mass and enhanced sprinting performance of male beginner athletes.*

**Keywords:** Creatine Supplements; Resistance Training; Sprinting Performance

**INTRODUCTION**

Now a day, different actions are taken by athletes around the world to enhance their performance. Those activities are collectively called Ergogenic Aids. It includes nutritional, pharmacological, physiological, psychological and mechanical aids. Among these, nutritional aids become the preference of many athletes due to their long term effect. In an age when success in sports is often associated with increased future earnings and when many athletes have a "win at all costs" attitude, the use of dietary supplements has increased markedly [10].

Dietary supplements are intended to supplement the diet. They contain one or more dietary ingredients including vitamins, minerals, herbs etc. They are intended to be taken by mouth, in forms such as tablet, capsule, powder, softgel, gelcap, or liquid [2].

Creatine is a naturally occurring amino acid derived from the amino acids glycine, arginine, and methionine [14]. It was discovered by Chevreul in 1832. The first reported use of creatine by elite athletes occurred during the 1992 Barcelona Olympics. The evidence was reported in British track and field athletes [13].

The daily requirement of creatine for sedentary individuals is approximately 2 to 3g; half is obtained from the diet, primarily from meat and fish, while the remainder is synthesized [14]. To be successful, sprinters should get adequate creatine every day. Studies show that it should not be less than 3 grams per day. Most creatine is stored in skeletal muscle, primarily as phosphocreatine; the rest is found in the heart, brain, and testis [7]. Body produces not more than half of daily creatine need. The rest should be provided with the diet.

Beginning from the last quarter of the 20<sup>th</sup> century, there are many research results published on creatine supplementation, protocols of administration and forms of creatine ([11] and [6]). Despite this, the mechanisms by which creatine acts in the human body to improve physical and cognitive performance are still not clear [4].

These days, many scholars are conducting researches on the relationship of creatine supplements and sprinting performance. However, as stated by Cooper *et al.* (2012) they do not clearly show the relationship between creatine supplements and sprinting performance. Especially, its effect on beginner athletes was untouched.

Most studies assured that creatine supplement is useful to boost the sprinting performance of elite athletes. However, there is a deficiency of studies conducted on the relationship of creatine supplements and sprinting performance of beginner athletes. This study comes up with concrete evidence on the effect of creatine supplements on the sprinting performance of male beginner athletes.

### OBJECTIVE

The objective of this study was to investigate the effect of creatine supplements on the sprinting performance of male beginner athletes.

### MATERIALS AND METHODS

**Study Area and Period** - This research was conducted at Haramaya University main campus. All the tests and physical activity trainings were delivered in the University's gymnasium and stadium. Resistance training was given inside the gymnasium and sprint training practiced in the stadium. This study was conducted for 12 weeks from October 10, 2012 to January 10, 2013.

**Subjects and Sampling Techniques** - Male beginner athletes (100m, 200m and 400m runners) who compete to represent Haramaya University in 6th Ethiopian Higher Education Institutions sport festival were the subjects and their age ranged from 18 to 25. Purposive sampling was used to select subjects. Thirty volunteer student athletes filled the medical history questionnaire. The questionnaire was prepared with the aim of identifying whether they were free from cancer, heart disease, stroke and kidney problems. Additionally, injury statuses were used as one selection criteria. Five of the thirty volunteers, rejected due to factors mentioned above and the other five withdrawn with draw. The study was conducted with twenty subjects.

**Instrumentation** - The following materials were used through the process of the study. Weight machine, stopwatch, whistle, Girth measurement (flexible metal tape measure), and sport equipment's such as Dumbbells, Treadmill, barbells, Weight benches, stationary bikes, Studio 6, etc. was used through the process of the study.

**Experimental Design** - Complete randomized design with double blind and placebo controlled was used for this study. The study was conducted for 12 weeks of resistance training associated with creatine supplementation. The effects of creatine supplementation on sprinting performance of male beginner athletes were studied. The subjects were divided into experimental and control groups. These groups were matched in terms of age level. The average age of the experimental group was  $20.1 \pm 0.9$  and the control group was  $19.8 \pm 1.1$ .

**Supplementation Protocol** - The control and experimental groups had been engaged in conditioning exercises for the first two weeks of this study. Then, to create physiological adaptation, the experimental group had begun taking low dose (2 grams) of creatine monohydrate supplement every training day. The control group kept exercise only. After being supplemented with 2 grams of CM, the dose of the supplement for the experimental group was increased to 5 grams per training day. Water was used as placebo for the control group. The supplementation was given 45 minutes before exercise. 200ml of water was used to dilute the 5 gram of creatine supplement. Equal amount of water was given to the control group.

**Exercise Training Protocol** - The selected subjects were divided into two groups. Both groups were engaged in conditioning exercise for the first 2 weeks. After two weeks of conditioning, the groups had begun performing resistance training (both weight bearing and weight free exercises). The duration of exercise was 45 minutes with the frequency of 3 days per week. They were advised, not to participate in any other physical exercise up to the end of this study.

**Experimental Measurements** - Body weight, body mass index and muscle mass (girth measurements which are upper arm circumference, chest circumference and thigh circumference) were measured. To check the improvement on the subjects, measurements were made three times at pre treatment (PT), during treatment (DT) and post treatment (PoT) for all of the tests. Calibrated digital balance beam scale was used to measure body weight and the unit was in kilogram. Then, BMI was calculated by using the following formula.  $BMI = \text{Mass (kg)} / \text{Height (m)}^2$ . Girth measurements were applied to estimate the muscle mass in selected areas. The middle part of upper arm (biceps and triceps); muscles of the thigh with hamstring and Chest circumference (sideway over the two nipples) were the measured areas. Flexible metal tape was used to measure the circumferences.

### Field Tests

**100m Dash And 200m Sprinting** - The common sprinting event, 100m dash and 200m sprinting tests were used at PT, DT and PoT. The overall sprinting performance of subjects was assessed through these tests. Both tests were taken in the early morning and repeated three times. The length of the time was recorded in seconds.

### METHOD OF DATA ANALYSIS

The data were analyzed by SPSS statistical software package Version 16. Paired sample t-test were used to identify significant differences between the scores of the two groups for body weight, body mass index, upper arm circumference, chest circumference, thigh circumference, 100m dash and 200m sprinting. Statistical significance for all data was set at  $p \leq 0.05$ .

### RESULTS AND DISCUSSION

In this study, field experiments as well as field tests had been taken three times (Pre, during and post). Under this 7 variables (body weight, BMI, upper arm circumference, chest circumference, thigh circumference, 100m dash and 200m sprinting) were measured. The results of those variables are discussed as follows.

**Table 1.** Bodyweight (kg) and body mass index (kg/m<sup>2</sup>) mean values

	CG			EG		
	PT	DT	PoT	PT	DT	PoT
BH (m)	1.68 ± 0.42	1.68 ± 0.42	1.68 ± 0.42	1.66 ± 0.67	1.66 ± 0.67	1.66 ± 0.67
BW (kg)	59.1 ± 2.27	59.6 ± 1.98	60.3 ± 1.95	56.7 ± 2.03	58.4 ± 1.68	60.1 ± 1.74
BMI kg/m <sup>2</sup> )	20.7 ± 0.57	21.0 ± 0.44	21.3 ± 0.43	20.4 ± 0.74	21.1 ± 0.67	21.7 ± 0.66

Values are mean ± SE, CG= control group, EG= experimental group, PT= pre training test which is taken before training and supplementation, DT= during training test which was measured at the 6th week of training and supplementation, PoT= post training test measured at the 12th week of training and supplementation, BH= body height, BW= body weight and BMI= body mass index.

The above table showed the body weight and BMI change both in experimental and control groups. The mean difference revealed that there was an improvement in body weight in both groups. This was due to the resistance training they were engaged in. 5.99% improvement of body weight was recorded in the EG and the CG increased by 2.03%. A greater change in the EG implied that, creatine monohydrate supplement enhances weight gain.

A research conducted on creatine supplementation by Eijende and his colleagues showed no effect on body weight. According to them, their subjects could not show an increase in body weight following six months of supplementation [5]. However, the mean difference in this study clearly showed that creatine supplementation increases body weight of male beginner athletes.

The mean value of body mass index (BMI) was increasing from one test to another among the groups. And more significant change distinguished in the EG. The EG exhibited 6.37% increase in BMI and 2.89% improvement was recorded in the CG. The main reason for the increase of BMI, especially in the EG was the increase of body weight. Hence, Supplementation of creatine monohydrate increased BMI. This result is consistent with the findings of Amani and his friends. The result of their investigation showed that creatine monohydrate significantly increased the Body Mass Index [1].

**Table 2.** Upper arm circumference (cm), chest circumference (cm) and thigh circumference (cm) mean values

	CG			EG		
	PT	DT	PoT	PT	DT	PoT
UAC (cm)	27.1 ± 1.16	27.7 ± 1.15	27.9 ± 1.14	26.8 ± 0.76	28.2 ± 0.81	29.2 ± 0.84
CC (cm)	30.2 ± 0.84	31.0 ± 0.79	31.3 ± 0.77	31.9 ± 0.66	33.8 ± 0.81	35.6 ± 0.93
TC (cm)	50.1 ± 1.07	50.5 ± 1.09	51.1 ± 1.14	49.4 ± 1.25	51.0 ± 1.38	53.1 ± 1.46

Values are mean ± SE, CG= control group, EG= experimental group, PT= pre training test which is taken before training and supplementation, DT= during training test which was measured at the 6th week of training and supplementation, PoT= post training test measured at the 12th week of training and supplementation, UAE= upper arm circumference, CC= chest circumference and TC= thigh circumference.

In all the above girth measurement results, the mean difference indicated that there was an improvement both in experimental and control group. This was due to the resistance training both groups were engaged in. 2.95%, 3.64% and 1.99% improvement on UAC, CC and TC respectively was recorded for the CG and the EG increased by 8.95%, 11.59% and 7.48% as per the previous order. The greater improvement in the EG implies that creatine monohydrate supplement had positive effect in improving the muscle mass of male beginner athletes.

A study conducted Bogdanis and his colleagues, 5 years before come up with similar results. The outcome was as follows: Including a 12 week resistance training program, the group that consumed creatine supplement demonstrated a remarkable increase in cross-sectional area of all types of muscle fibers. In contrast with the smaller increase in the CG [3]. This result is also matched with the findings

of Michael and his friends. They pointed out that creatine Supplements significantly increased skeletal muscle [8].

**Table 3.** 100m dash (s) and 200m sprinting (s) mean values for male beginner athletes of both control group (CG) and experimental group (EG); at different occasions of training program

	CG			EG		
	PT	DT	PoT	PT	DT	PoT
100m (s)	13.98±0.19	13.85±0.19	13.57±0.19	13.88±0.18	13.16±0.18	12.53 ± 0.16
200m (s)	30.19±0.51	29.58±0.53	28.80 ± 0.50	30.54±0.53	28.36±0.45	26.81 ± 0.25

Values are mean ± SE, CG= control group, EG= experimental group, PT= pre training test which is taken before training and supplementation, DT= during training test which was measured at the 6th week of training and supplementation, PoT= post training test measured at the 12th week of training and supplementation.

The negative mean value difference in both groups showed that; they decreased the time to finish 100m and 200m sprinting. The CG decreased the sprinting time by 2.93% and 4.60% for 100m and 200m sprints respectively. The EG reduced the sprinting time by 9.73% and 12.21% for 100m and 200m sprints respectively. This result was coming due to the improvement of muscle mass (body weight) and sprinting speed as it is shown from Table 1 to Table 3. The resistance exercises and the sprint training brought this change in both groups. However, a more significant improvement in the EG was due to supplement they used. In general, creatine monohydrate supplementation enhances sprinting performance in 100m and 200m running.

The data (Table 3) showed a better improvement in the group who consumed creatine monohydrate supplement (EG). This group demonstrates a greater change in sprinting speed. Depend on this result; it is possible to conclude that creatine supplementation enhances sprinting performance in male beginner athletes.

In a study which was conducted for 5 days by Snow and his friends. The sprint-exercises performance of athletes could not be improved [12]. The other study which was conducted by Michael *et al.*(1999) one year later: peak power and work output during five bouts of maximal 10sec cycle sprints were unchanged by Creatine Supplementation, either acutely or for up to 4 week after supplementation, in comparison to the placebo group. They concluded that Creatine Supplementation did not increase maximal intermittent sprinting performance. However, this result assured that creatine supplement is important to boost the sprinting performance of male beginner athletes.

**Table 4.** The mean difference value and significance level of each test results in both CG and EG

Dependent Variable			Para (I)	Para (J)	MD (J-I)	Sig.
			EG	CG	EG	CG
Body Weight(Kg)	PoT	PT	3.42	1.17	0.000	0.092
		DT	1.74	0.48	0.011	0.383
BMI (Kg/m <sup>2</sup> )	PoT	PT	1.26	0.56	0.000	0.038
		DT	0.68	0.26	0.004	0.247
Upper arm Circum. (cm)	PoT	PT	2.35	0.80	0.000	0.002
		DT	1.44	0.57	0.000	0.002
Chest Circum. (cm)	PoT	PT	3.74	1.11	0.000	0.001
		DT	1.91	0.80	0.000	0.001
Thigh Circum. (cm)	PoT	PT	3.70	1.10	0.000	0.000
		DT	1.60	0.55	0.000	0.007
100m (s)	PoT	PT	-1.35	-0.41	0.000	0.001
		DT	-0.71	-0.13	0.002	0.021
200m (s)	PoT	PT	-3.73	-1.39	0.000	0.012
		DT	-2.18	-0.61	0.000	0.025



MD= mean difference, CG= control group, EG= experimental group, PT= pre training test which is taken before training and supplementation, DT= during training test which was measured at the 6th week of training and supplementation, PoT= post training test measured at the 12th week of training and supplementation.

Table 4 showed the overall result of each test. It includes the mean difference from one test to another and the significance of post tests in reference to the pre tests. 100m and 200m sprinting time was decreased in both groups. More significant improvement was recorded in the experimental group. In all the other parameters, both groups exhibited a remarkable change. This was due to the resistance training both groups engaged in. However, a more significant change in the EG was an evident for the positive effect of creatine monohydrate supplement on body weight, muscular mass and sprinting performance.

Generally, the 100m and 200m sprinting test result of this study revealed that creatine monohydrate supplement is useful to boost the sprinting performance of male beginner athletes. The results of this study are comparable with the findings of [1], [3], [5], [8], [9] and [15].

### CONCLUSION

Based on the major findings of the study, the following points are stated as a conclusion.

- Creatine monohydrate supplement has a significant effect on the improvement and enhancement of sprinting performance. As indicated by Haramaya University participants, male beginner athletes who used creatine supplements could enhance their sprinting performance.
- The increase in sprinting performance was due to the increment of available serum and muscle creatine. In addition, the improvement of sprinting components (muscle mass, muscle strength and muscle endurance) played a great role in the overall change of sprinting performance.
- The body weight had been changed significantly. This gain in bodyweight was due to the increment of muscle mass, which is important for sprinting performance. This change in bodyweight raised the BMI.

### RECOMMENDATIONS

Based on the findings of this study, the following points are recommended to investigate more on the relationship of creatine supplements and sprinting performance.

- Athletics coaches and other concerned bodies should give due attention to athletes nutrition. It is nice if they know and emphasize on the energy systems their athletes use as well as their daily calorie needs. If they get their energy level insufficient even after good nutrition, they shall make them use dietary supplements. For sprinters, creatine supplements would be more beneficial. It increases the readily available energy in their exercise with creatine phosphate system. Hence, sprinters shall get creatine supplement if their performance needs to be raised.
- To get the finest benefit from creatine supplements: firstly, it shall be used with resistance training. It makes the body ready to use the supplement. Secondly, it is better to take it for longer period of time with proper exercise.
- Related to creatine supplements, the future research shall focus on: the actual dose to be taken to enhance performance; its effect on female athletes; the possible benefits of the supplement in other sports like football, volley ball, basketball, etc. and the possible side effects of the Cr supplement.

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