Nutritional Supplements in Biology and Science Textbooks of Intermediate Stage and the Extent of Teachers' Knowledge of them


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ABSTRACT

The current study aims to identify to what extent nutritional supplements are included in science and biology textbooks for the intermediate stage for the academic year 2018–2019, in the first place, and the teachers' knowledge about them, in the second place. To achieve the first goal, the researchers adopted French taxonomy of peoples' high commission of health of nutritional supplements to build up the study tool. The list includes the ingredients of nutritional supplements (vitamins, hormones, chemical and minerals, amino acids and living organisms). The list of nutritional supplements in its initial version includes (55) items distributed on the five contents. The list is presented to arbitrators and specialists in curriculum, methods of teaching and nutrition. The final version of the list in consists of (55) item. After getting the tool validity and analysis reliability, science textbooks of intermediate stage (2018–2019) are analyzed based on the prepared list. The analysis comprises (313) page, and the explicit and implicit ideas are adopted as a unit of registration and repetition is a unit of counting. The most important result is that science and biology textbooks of the intermediate stage have included the ingredients of nutritional supplements in comparison with the criterion-referenced ratio that the researchers adopted based on the experts' opinions, which is (10%). Biology textbook of the 1st stage (Human and his Health) gets the first rank in its inclusion of nutritional supplements while science textbook of the 1st stage gets the second position, and science textbook of the 2nd stage does not include any ingredient of nutritional supplements. To achieve the second goal, the researchers have built up a scale that its contents are identified based on the analysis tool contents. To verify the face validity, the scale has been presented to several arbitrators in the field of nutrition and methods of teaching science. The researchers used re-testing to verify the scale reliability and it is (0,86). The scale of (34) item is ready to apply on the sample distributed on five components: vitamins, hormones, chemical and minerals, amino acids and living organisms. The scale is applied on the study sample of (30) male teachers and (30) female teachers who are selected randomly from the study population. In light of the results, the researchers recommend several recommendations as focusing on the ingredients of nutritional supplements in the textbooks of the 1st, 2nd and 3rd stages through redistributing the chapters on the intermediate stage taking into consideration the balance of distributing nutrition concepts of all books. Also, the researchers introduce several suggestions as conducting similar study on other stages like primary and preparatory stages. Moreover, make a research to measure the level of biology teachers' and students' acquisition of the concept of nutritional supplements.

Keywords: Nutritional supplements, Science and biology textbooks, Intermediate stage.

Introduction

Nutritional supplement is one of the topics that takes a great interest of different classes of society especially adolescents due to the propaganda for various kinds of nutritional supplements, and their importance in our daily life and individual's life. Moreover, the image of body and outward appearance and social acceptability that the individual wants to reach have a direct impact on using supplements taking into consideration the risks of supplements without supervision or his/ her real need, weight, age, hormones and food habits. Based on this fact, the researchers intend to shed light on the importance of providing the individuals with adequate information through school textbooks especially in science and biology books in addition to information the teachers provide them during the education programme.

Importance of the study

Nutrition is one of the fields of health sciences that focuses on what provides human body with his/ her nutritional needs that are available in different types of foods, which are necessary to sustain bio-interactions and body functions. The body needs various nutritional elements and minerals, where every element separately or collectively with other elements help body to perform its basic indispensable functions. (Sadiq, 2011, 21). Good food motivates people to have full meals that include basic elements like (protein, carbohydrates, fat, vitamins, minerals and water). So, the emphasis is on the quality and quantity of food. (Malih and hatim, 2013, 114). It is useful to know what we are eating. It is not sufficient to enjoy eating his/ her food without knowing what are the elements of his/ her food and the sources of food, but it is important to realize the effects of much or less of food and its relation to health and improve life. (Sadiq, 2011, 114).

The responsibility of preserving health falls on the shoulder of every person in society that requires a specific behavior in daily life. Failure to follow sound healthy behavior of nutrition leads to the emergence of some diseases that influenced not only the individual but also society. The period of education is the most suitable period to develop nutrition education. The students of today are the fathers and mothers of tomorrow. They are the largest sector of society, their behavior can be affected and changed easily and they represent the potentials to convey the health knowledge to their families and relatives. They can, through different ways, change the prevalent health ideas and nutrition practices and contribute to improve health condition for their families and societies. (Al-Sudany, 2005, 11). The good health is closely related to food and we should realize that expensive food is not always the healthy and necessary for our bodies. Healthy food is the one that contains all basic elements the body

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needs in balanced quantities. (Mosa, 2010, 59). Moreover, the individual's knowledge of sciences, health, selection of food, preparing meals, sound eating habits, the relation between food and other variables like: diseases, type of work, gender and age contribute to raise health level of the individual and works on limiting many food-related problems. (Abdulghani, 2005, 6).

The researchers think that learning nutritional behavior for the community members including students can be achieved through curriculum, which is the considered the first pillar to implant this behavior. This step will develop the information and skills for the correct nutritional behaviours of the individuals. Through curriculum, the school role can be more effective to develop nutritional awareness and change their inappropriate nutritional behaviours, and amend them to get balanced food. (Al-Otaiby, 2013, p.5). Based on what is previously mentioned, science curriculum is the most appropriate textbooks to provide students with sound food habits, develop their health attitudes and provide them with health and nutritional education. (Al-Burkaty, 2013, p.5). Moreover, it is an important field to acquire life skills that student needs in his/her daily life especially those related to practical skills like body care skill, healthy food skill and skill of prevention diseases. (Qishta, 2008, p.5).

The importance of the study includes:
- In response to the tendencies that call for taking care of nutritional meals and follow the balanced diet to preserve the body health.
- Identify the information of science and biology teachers of the intermediate stage about nutritional supplements.
- Introduce the criteria of nutritional supplements, which can be used by other researchers to analyze books of other stages or by the developers of curriculum.

The study goals: The study aims to identify the following:
- Nutritional supplements in the contents of science and biology textbooks of the intermediate stage.
- Knowledge of the intermediate stage teachers of nutritional supplement.

The study limitations: the present study is limited to:
- Biology textbook for 2nd intermediate stage (Human being & Health), ed.8, 2018.

Defining Terms:
- Nutritional supplements: defined by (Shahab, 2004) as products for consumption to complete the eaten food and compensate insufficient ration of daily food. (Shahab, 2004, 138).

It is also defined by (Malih and Hatim, 2013) as combination of natural food extracts (animal or vegetable), and ready to eat of different forms and sizes (pills, capsules, liquid and powder) that include the nutritional materials. (Malih and Hatim, 2013, 15).

The researcher define them procedurally: First: nutritional supplements mentioned in sources: "a group of food products (like vitamins, minerals, food stuff and herbs as (Algas, mushroom and legumes) and (animal product, amino acid, hormones and microorganisms like bacteria and yeast in addition to some food ingredients that have treatment properties), which should be included in the textbooks of science and biology. Second: nutritional supplements for teachers: a group of food products (like vitamins, minerals, food stuff and herbs as (Algas, mushroom and legumes) and (animal product, amino acid, hormones and microorganisms like bacteria and yeast in addition to some food ingredients that have treatment properties) that measured through the score they will get in the test prepared for this purpose.

Theoretical background:
First: it is defined by (Kamash, 2011) as the materials (animal-vegetable) eaten by the living organism through digestive system and used to maintain body growth and disease prevention. (Al- Yasiri, 2008) has defined it as any material, except oxygen, eaten by human being and becomes part of his/her body. Human food is a mixture of food stuff that gives energy, builds and regenerates body cells (Al-Yasiri, 2008, 25). (Mahmood, 2010) mentions that food is three kinds:
- Food contains protein, fat and carbohydrate.
- Food contains vitamins.
- Food contains minerals and water. (Mahmood, 2010, 16)
- Also, (Hassan, 1999) classifies food stuff according to their benefit and the purpose to the following kinds:
- Food stuff related to body building; it includes proteins and some other inorganic minerals.
- Energy food stuff that includes fat and carbohydrate.
- Preventive materials (preservatives) that mainly include vitamins, some proteins and some rare nutritional materials. (Hassan, 1999, 9).

Food basic functions:
- Provide body with necessary energy for work and motor and provide muscles with necessary energy for constriction.
- Build up and growth of body and regenerate dead cells.
- Organize functions, bio-chemical processes inside body cells like (organize secretion of glands of the body), stimulate nerve signals, affect physical, psychological, social and health condition (preventive food can be used) (Dhiabat and Al-Jubor, 2011, 202-203).

Characteristics of ideal food:
- Includes all basic, balanced and sufficient nutritional elements.
- Empty of biological, chemical and physical pollution.
- Palatable, digestible and affordable.

Factors affected nutritional needs: individuals needs are variant according to certain factors:
- Age: children, for example, need more protein and calcium during rapid growth phases to build their cells and bones.
- Sex: men nutritional needs are greater than female but women needs for protein and iron increase during suckling and pregnancy.
- Nature of work: manual crafts that require muscular effort need more fat and carbohydrate to produce energy.
- Nature of weather: in cold weather increases human needs of fat and carbohydrate to compensate lost temperature of the body.
Health condition: nutritional needs change due to the
health or sickness as in diabetes. (Abdulrahman and
Public safety procedures of food: there are basic for food
community safety including:
- Eliminate crawling and flying insects in the place of food
preparation.
- Maintain public hygiene of the place of food preparation.
- Wash hands with water and soap before preparing food to
prevent contamination.
- Never wear metal accessories during food preparation and
cover the head.
- The person should not have wounds, bandages or ointment
during preparation of food.
- Wash kitchen utensils with water and cleaning detergents
before and after using them in addition to the tables.
- Never leave for the homeless or pets to enter kitchen and
food stores to ensure the safety of food. (Al-Hafidh, 2014,
25-26).
Vitamins: they are organic compounds the body needs with
slight amount. They are very important to organize body
maintenance and growth and diseases resistance. Some are
necessary to transform and assimilation of energy but they
do not transform into energy. Vitamins are divided into
two divisions:
- fat-soluble vitamins: this kind of vitamins dissolve in fat
but not in water and includes (A, D, E and K). They are
stored in tissues of the body especially in (liver) with big
quantity. So, there is no shortage when eaten daily for a
short period of time. Excessive eating of these vitamins lead
to poisoning.
- Water- soluble vitamins: they include "B" complex and "C".
They are not stored in specific body cells. The symptoms
of their shortage happen faster than fat- soluble vitamins
when not eaten for a shorter period of time (Musaqir, 2001,
27-28). (Mahmood, 2010) has mentioned the reasons of
vitamins shortage are:
- Lack of food diversity and stick to one type of food.
- Insufficiency of the body for vitamins especially in some
disease situations like liver and digestive systems diseases.
- The body need to vitamins in case of suckling and
Hormone: it is chemical substance secreted to the body
from one or group of cells and has physiological control on
other cells. It can be defined as "chemical substance
secreted to blood directly from ductless glands to regulate
certain function. Hormones function to organize the work
of body organs. Some hormones have quick effect like
adrenaline, which prepares the body for critical situation,
and insulin the regulates blood sugar. Some others are slow
action for long period of time like growth and sexual
hormones. Moreover, "hormones are chemical substances
directly secreted to the blood by the ductless glands.
Hormones are chemical substances that act like messenger
for all body parts to stimulate certain nerves. Hormones
are divided into several types based on their secretion
timing:
- hormones secreted continuously and sometimes increase
or decrease based on the body need like insulin hormone
secreted by islets of Langerhans in pancreas after eating.
- Periodical hormones like ovary hormone (progesterone)
that regulates women's period.
- Hormones secreted when needed like cortisol hormone
from adrenal glands. It stimulates metabolism and sudden
response of pressures as wounds, fasting, infections or
- Chemical elements and minerals: they play an important
role in man's life. Man is in continuous need for necessary
elements that he/she gets from air, water and food. Among
the most important minerals are (Sodium, Potassium, Iron,
Calcium, Magnesium, Iodine and Fluorene) The roles of these
minerals are:
- Maintain blood density, secretions, liquids and organize
chemical reactions of the body.
- Prevent the contents of the digestive canal from
fermentation and decay.
- Help the body to build up tissues, bones, tooth, cartilages
and muscles.
- Give the body liquids the ability to diffuse and keep their
pressure, and the blood the ability to congeal when
necessary.
- Forming the blood hemoglobin and tissues flexibility.
(Dhiabat and Al-Jubor, 2012, 52-53)
- Amino acids: they are chemical substances that contain
nitrogen and they are necessary to create protein in the
body. They are used to regenerate and compensate body
cells and tissues. (Musaqir, 2001, 22). Amino acids are
divided into two parts:
- Essential amino acids: they are necessary for the body
growth and continuity of life. Man cannot synthesize these
acids in sufficient quantity to meet the body needs. So,
man has to eat them through food. These acids include:
threonine, leucine, valine, Methionine, Phenylalanine,
Tryptophan and Lysine.
- Nonessential amino acids: they are the acids the body can
synthesize according to the body needs. Their effect is not
so great on the body and their work like supporting
essential amino acids. (Ibrahim and Kamash, 2010, 37). So,
the fact that show the importance of essential amino acids
is that they are not stored in the body. These acids include:
Histidine, Alanine, Asparagine, Aspartic acid, Glutamic acid

Second: Nutritional supplements
They include a wide group of products like vitamins, minerals,
food stuff, herbs as algae, mushroom and legume in addition to
animal products like fish oil, bees products, amino acids and
hormones (Shahab, 2004, 138). Nutritional supplements are ready
made according to certain quantities. These substances include:
- Creatine monohydrate or pure Creatine.
- Binary compound of carbohydrate and creatine and is
called carbocreatine.
- Ternary compound includes creatine, carbohydrate and
protein and is called creatprotein and it is amino acid.
- Benefits of nutritional supplements:
- provide body with energy, rebuild damaged cells and
maintain muscular fibers after physical effort.
- Increase the area of physiological section of muscular
fibers.
- Gain the muscular strength and increase tolerance of
physical work for longer period and prolong endurance of
circulatory- respiration system.
- Increase body metabolism and immunity.
Negative aspects of nutritional supplements

- Allergy and stomach disorders.
- Renal failure especially for those who suffer from renal diseases and muscles contraction
- Diarrhea and inability to adapt with thermally. (Malih and Hatim, 2013, 153-161).

The study methodology and procedure

First: in respect to analyze the contents of science and biology textbooks of intermediate stage, the analysis process includes the following:

1. The study methodology: the researchers follow descriptive analysis approach to analyze the contents of science and biology textbooks of intermediate stage according to the ingredients of nutritional supplements.
2. The study population and the sample: A-population: it contains all elements of the study problem. The present study involves biology textbooks for intermediate stage, republic of Iraq for the academic year 2018-2019, which represents a statistical population.
3. B-source of data: the researchers adopt the content of science and biology textbooks of the intermediate stage excluding questions in the end of each chapter, book’s introduction and contents list as shown in table (1).

<table>
<thead>
<tr>
<th>No. of analyzed pages</th>
<th>Pages Total number</th>
<th>Publication year</th>
<th>Edition</th>
<th>Class</th>
<th>Book title</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>91</td>
<td>2018</td>
<td>Ed. 3</td>
<td>1st intermediate</td>
<td>Science 2nd part</td>
<td>1</td>
</tr>
<tr>
<td>104</td>
<td>164</td>
<td>2018</td>
<td>Ed.2</td>
<td>2nd intermediate</td>
<td>Science 1st part</td>
<td>2</td>
</tr>
<tr>
<td>160</td>
<td>216</td>
<td>2018</td>
<td>Ed.8</td>
<td>3rd intermediate</td>
<td>biology</td>
<td>3</td>
</tr>
<tr>
<td>313</td>
<td>471</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total: 471 pages analyzed

3. The study tool: the researchers build up a tool of analysis of science and biology textbooks of intermediate stage, and includes the ingredients of nutritional supplements, which should be available in the content of biology textbook of intermediate stage. The researchers depend on the classification of Comité suprême de la santé populaire (CSHPF) of nutritional supplements. So, the study tool is prepared in its initial version that contains list of nutritional supplements of (55) items distributed on five concepts: vitamins (14) item, hormones (4) item, chemical elements and minerals (18), amino acid (5) and living organisms (14) item. Appendix (1).

4-Validity of analysis tool: it means how the tool is suitable for measuring the item. To verify the tool validity, the initial version of the tool is presented on some arbitrators and specialists in methodology and curriculum to ensure its face value. They give their remarks about the tool.

1-4-Tool face validity: Since the arbitrators are (20), the researchers consider the standard is valid when it gets the approval of (17) arbitrators, which means %85 agreement of the arbitrators. In this way, the tool is valid and suitable for the study. It comprises (55) items distributed on five concepts: vitamins (14) item, hormones (4) item, chemical elements and minerals (18), amino acid (5) and living organisms (14) item. Table (2)

Table 2: Number of items of nutritional supplements and percentage.

<table>
<thead>
<tr>
<th>No. of items</th>
<th>Sub-concepts</th>
<th>Major concepts</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25, 45</td>
<td>9</td>
<td>Fat- soluble vitamins A,D,E and K</td>
<td>Vitamins</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Water- soluble vitamins B and C</td>
<td></td>
</tr>
<tr>
<td>7, 27</td>
<td>4</td>
<td>Animal hormones like Deca-Durabolin, Sustanon and primobolan.</td>
<td>hormones</td>
</tr>
<tr>
<td>32,73</td>
<td>14</td>
<td>Elements and minerals the body needs with big quantity like Ca, K, P and Na.</td>
<td>Chemical substances and minerals</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Elements and minerals the body needs with little quantity like Cu and I.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Amino acids</td>
<td>Essential amino acids like threonine, leucine, valine, Methionine, Phenylalanine, Tryptophan and Lysine that found in animal and plant protein</td>
</tr>
<tr>
<td>5</td>
<td>Living organisms</td>
<td>Probiotics bacteria</td>
<td>brewer’s yeast</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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5-Analysis of biology textbook of the intermediate stage: The researchers depend on the following steps:

- The goal of analysis: is recognize the content of science and biology textbooks of intermediate stage of nutritional supplements according to the study tool.
- Analysis unity: the researchers depend on explicit idea as a unit for analysis because most of items are clear and do not need interpretation in comparison with the textbooks of other disciplines. The researchers adopt repetition as a unit for calculation.
- Steps of analyzing the content: the researchers adopt the following steps in the process of analysis:
  - Read the topic carefully to identify the main ideas.
  - Read the topic for the second time carefully to define the major ideas.
  - Specify the type of the ideas in each statement according to the tool of the researchers, then isolate the implicit idea from the explicit one.
  - Put the results in the analysis table and give one repetition for each idea that has an index of analysis tool.
- Validity of analysis: to ensure the validity of analysis, the researchers present a sample of the analyzed material of biology textbook for the 3rd intermediate stage on two experts of methods of teaching science*, and they concur on the validity of analysis.

| Table 3: Agreement coefficient the researcher concludes with himself and with external analyzers. |
|-------------------------------------------------|-------------------------------------------------|
| 0.94 Between the researcher and himself after 30 days | Analysis reliability through time |
| 0.82 Between the 2nd researcher and 1st analyzer | Analysis reliability among analyzers |
| 0.91 Between the 2nd researcher and 2nd analyzer | |
| 0.93 Between the 1st researcher and the 2nd | |
| 0.90 Total | |

6-validity of analysis: to ensure the validity of analysis, the researchers present a sample of the analyzed material of biology textbook for the 3rd intermediate stage on two experts of methods of teaching science*, and they concur on the validity of analysis.

7-reliability of analysis: it means that the tool gives the same results if it is reused by the current researcher or another one. (Al-Dhabia', 2006, 102). For the analysis to be objective or close to objectivity and reliability, the researchers use two types of reliability:

7-1-reliability through time: It means that the analyzer himself (the researcher) gets the same results (in the first analysis) when the analysis is repeated for the second time after 30 days from the first analysis.

7-2-reliability of analysis for analyzers: it means that how the results of analysis coincide with the results of the external analyzers. The researchers ask the services of external analyzers (in methods of teaching of biology) who are known of their experience in analyzing the content. This step is accomplished through selecting random sample of the total content (313) page. The sample is (%20) ; (63) page of biology textbook of 3rd intermediate stage. It includes five chapters (building human body, skeletal system, muscular system, digestive system and circulatory system). Reliability calculated coefficients by using Holsti equation equals (0,82) as for the second researcher and the first analyzer*, and (0,91) for the second researcher and the second analyzer**, and (0,93) for the first researcher and the second researcher. So, reliability coefficient is acceptable.

- Key scoring: scoring the scale means to give marks the answers of the testees on each item in light of given alternatives. There are three alternatives for each item and given (1,0) mark.
- Scale validity: to ensure the validity of the scale, the researchers present the scale on several arbitrators and specialists in methodology, curriculum and nutrition. There are (20) arbitrators give their remarks on the tool, which gets (%80) of their agreement and it is high percentage and the tool is valid and ready to use.
- Scale reliability: In order to ensure the scale reliability, the researchers select (30) teachers as random sample from outside the study sample, The tool is applied twice on this sample with a considerable time lag of (15) days. Then, reliability of the first and the second applications are measured using Pearson coefficient (%86) and it is high coefficient. After ensuring the scale validity and reliability, the researchers consider it ready to use.

**Final application of scale**

After ensuring validity and reliability of the final version of the scale, the researchers apply it on the study sample of (60) teachers. The application commenced from 31/3/2019 to 18/4/2019. The researchers apply the scale on the study sample by themselves.

**Third: Statistical processing**

The researchers use (SPSS-23) and (Microsoft excel) to handle data: 1-percentages and repetitions of results of content analysis. 2-Holsti equation for measuring analysis reliability, 3-Pearson coefficient to measure scale reliability=P

Since NP= number of agreement, N1-N2= number of disagreement.

(Cooper, 1974, 27)
Results analysis

This section includes the study results and the discussion according to its goals:

Results of the first goal: to identify the inclusion of nutritional supplements in the contents of science and biology textbooks for the intermediate stage.

Table 4: Repetitions and percentages for the ingredients of food supplements in the textbook of science of 1st intermediate stage (2nd part).

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Repetitions</th>
<th>Concept</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>Vitamins</td>
<td>1</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>Hormones</td>
<td>2</td>
</tr>
<tr>
<td>%100</td>
<td>2</td>
<td>Chemical elements &amp; minerals</td>
<td>3</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>Amino acids</td>
<td>4</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>Living organisms</td>
<td>5</td>
</tr>
<tr>
<td>%100</td>
<td>2</td>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

The results showed that the textbook had (2) repetitions distributed on chemical elements and minerals, and the textbook neglects (vitamins, hormones, amino acids and living organisms).

Table 5: Repetitions and percentage for chemical elements and minerals in the textbook of science of 1st intermediate stage, 2nd part.

<table>
<thead>
<tr>
<th>%Hgl</th>
<th>Achieved items</th>
<th>% repetitions</th>
<th>Item</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>2</td>
<td>1</td>
<td>Iodine is essential in thyroxin hormone that regulates growth processes.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50</td>
<td>Lack of iodine leads to Goitre</td>
<td>2</td>
</tr>
<tr>
<td>100</td>
<td>2</td>
<td>1</td>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

The results of table (5) show that the item related to the role of iodine in the composition of thyroxin hormone that regulates growth has gained one repetition by (%50) while the item related to lack of iodine leads to goiter has got one repetition by (%50). The book neglects other items and other repetitions are (2). It is noted that the book has achieved (2) items by (%Hgl) and neglects (16) items of this textbook. Based on these results, science textbook of 1st intermediate stage, 2nd part, has achieved (2) items of the standard of nutritional supplements by (%3, 44) and neglects (53) items and this percentage is very weak when compared with criterion-referenced percentage that the researchers adopted based on the experts' views by (%40). This refers that the book does not cover the topic of nutritional supplements.

Table 6: Repetitions and percentage of nutritional supplements elements in the biology textbook of 3rd intermediate stage.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Repetitions</th>
<th>Concept</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>%57, 78</td>
<td>11</td>
<td>Vitamins</td>
<td>1</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>Hormones</td>
<td>2</td>
</tr>
<tr>
<td>%43, 21</td>
<td>3</td>
<td>Chemical elements &amp; minerals</td>
<td>3</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>Amino acids</td>
<td>4</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>Living organisms</td>
<td>5</td>
</tr>
<tr>
<td>%100</td>
<td>14</td>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

The results show that the book has (14) repetitions distributed on the following elements: (vitamins, chemical elements and minerals). The book neglects (hormones, amino acids and living organisms). Vitamin element gets (11) repetitions by (%57, 78) while chemical element and minerals get (3) repetitions by (%43, 21). But the book neglects the content of (hormones, amino acids and living organisms).

Table 7: Repetitions and percentage of vitamins content in biology book of 3rd intermediate stage.

<table>
<thead>
<tr>
<th>%43,71</th>
<th>Achieved items</th>
<th>% Repetitions</th>
<th>Item</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
<td>9,1</td>
<td>Shortage of A vitamin leads to night blindness, skin dryness, weak resistance of mucous and body</td>
<td>1</td>
</tr>
</tbody>
</table>

Science textbook for 1st intermediate stage (2nd part): the results of analysis is shown in table (4). The number of analyzed papers are (49) excluding questions in the end of chapters, bibliography and introduction.

Textbook of science for 2nd intermediate stage (1st part): the researchers analyze the content of science textbook for 2nd intermediate stage. The analyzed pages are (104) excluding questions in the end of the chapter, bibliography and introduction. The result that the textbook does not achieve any item of nutritional supplements (vitamins, hormones, chemical elements, amino acids and living organisms).

Textbook of science for 3rd intermediate stage (human and health): the results of content analysis of biology textbook for 3rd intermediate stage are shown in table (6), where the total number of analyzed pages is (160) excluding questions in the end of the chapter, bibliography and introduction.
Table (7) shows that the item (Vitamin D works on increasing Calcium and phosphorous absorption to build bones) has (2) repetitions by (%67,66) while the item (Vitamin D helps bones teeth to grow) and the items related to (vitamin A, E, K, B and C) have (1) repetition and neglects other items. The number of repetitions of the element is (11) repetitions. It is noted from the table that the book has achieved (10) items by (%43, 71) and neglects (4) items. So, biology textbook of 3rd intermediate stage has achieved (10) items in the criteria of nutritional supplements by (%67,66) and neglects (45) items. This result is acceptable and good if compared with criterion-referenced percentage that the researchers adopted based on the experts’ views (%10). It denotes that the book focuses on some ingredients of nutritional supplements in the book dedicates a chapter for food.

Table (8) shows that the item related to the composition of thyroxin hormone that regulates growth process gets one repetition by (%33,33) while the item related to lack of iodine leads to the enlargement of thyroid gland gets (2) repetitions by (%67,66) and other items are never mentioned. The total number of repetitions are (3). It is noted that the book has achieved (2) items by (%II,11) and neglects (16) items. So, biology textbook for 3rd intermediate stage has achieved (2) items from the criteria of nutritional supplements by (%64,3) and neglects (53) items and this percentage is unsatisfactory and weak when compared with criterion-referenced percentage that the researchers adopted based on the experts’ views by (%10). It refers that the book does not focus on the element of chemical substances and minerals.

### Biology textbook for the three stages together

The results of analysis of the content of the three intermediate stages (1st, 2nd and 3rd) as shown in table (9). The total analyzed pages in these books are (333) excluding questions in the end of the chapters, bibliography and introduction.

Table (9) reveals that some items criterion of nutritional supplements content have been achieved in unsatisfactory and weak form especially in the textbook of (1st and 3rd) intermediate stage.

- **Table 8: Repetitions and percentage of the element of chemical substances and minerals in biology book for 3rd intermediate stage.**

<table>
<thead>
<tr>
<th>% Achieved items</th>
<th>% Repetition</th>
<th>Item</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>II,11</td>
<td>2</td>
<td>33.33</td>
<td>1</td>
</tr>
<tr>
<td>67,66</td>
<td>2</td>
<td>Shortage of iodine leads to enlargement of thyroid gland</td>
<td>2</td>
</tr>
<tr>
<td>100</td>
<td>3</td>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

- **Table 9: Repetitions and percentage for the ingredients of nutritional supplements in textbooks of science and biology for the three stages.**

<table>
<thead>
<tr>
<th>Three books together</th>
<th>3rd</th>
<th>2nd</th>
<th>1st</th>
<th>Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Repetition</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>75,68</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>Vitamins</td>
</tr>
<tr>
<td>-</td>
<td>6,78</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>25,31</td>
<td>5</td>
<td>4,21</td>
<td>3</td>
<td>Chemical elements and minerals</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Amino acids</td>
</tr>
<tr>
<td>100</td>
<td>16</td>
<td>5,78</td>
<td>14</td>
<td>Living organisms</td>
</tr>
</tbody>
</table>

They collected (16) repetitions by (%12,5) for the 1st stage and (%78,5) for the 3rd stage. The topics of the two books include (14) items of the criterion by (%25, 45), where the books neglect (41)
Results of the second goal

To identify the knowledge of the teachers of science and biology in the intermediate stage of nutritional supplements

The researchers apply the test of nutritional supplements on (60) teachers of the sample, the results show that the mean of nutritional supplements for the teachers scores is (19,61) and standard deviation (3.95). To recognize the difference between the achieved mean and hypothetical mean is (17). T-test is used for one sample and the results reveal that the value of calculated T is (5.12) and it is higher than tabular value (2) at significance level (0,05) and freedom degree (59). This refers to significant differences in favour of the achieved mean of the test. Moreover, it means that teachers have acceptable level of information about nutritional supplements because the teachers' achieved mean is higher than hypothetical one. Table (10) discusses this issue:

<table>
<thead>
<tr>
<th>Significance</th>
<th>T tabular value</th>
<th>Freedom degree</th>
<th>T calculated value</th>
<th>Hypothetical mean</th>
<th>Standard deviation</th>
<th>Mean</th>
<th>No. of teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>significant</td>
<td>5,12</td>
<td>59</td>
<td>17</td>
<td>3,95</td>
<td>19,61</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

The researchers then compare among the sample members according to sex variable. They are (60), (30) males and other (30) are females. The results show that the mean of nutritional supplements for teachers' scores is (19.93) and standard deviation is (4.51). For the mean of female teachers is (19.30) and standard deviation is (3, 34) then T test is used for two independent samples. The results reveal that the value of calculated T is (0,617) and it is less than tabular value (2) at significant level (0,05) and freedom degree (58). This refers that there are no differences of statistical significance between female teachers and male in nutritional supplements test. Table (11) shows these results.

<table>
<thead>
<tr>
<th>Significance</th>
<th>Tabular value</th>
<th>Freedom degree</th>
<th>Calculated T-value</th>
<th>Standard deviation</th>
<th>Mean</th>
<th>No. of teachers</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>insignificant</td>
<td>2</td>
<td>58</td>
<td>0,617</td>
<td>4,51</td>
<td>19,93</td>
<td>30</td>
<td>Male teachers</td>
</tr>
<tr>
<td></td>
<td>3,34</td>
<td></td>
<td></td>
<td>19,30</td>
<td>30</td>
<td>Female teachers</td>
<td></td>
</tr>
</tbody>
</table>


Conclusion

Science and biology textbooks

A-science and biology textbooks of the intermediate stage focused on the ingredients of nutritional supplements by (%10) when compared to the criterion- referenced percentage the researchers adopted based on the arbitrators' opinions.

B-biology textbook for the 3rd intermediate stage (Human and Health) gets the 1st place in the inclusion of nutritional supplements content. In the second place comes science textbook of 1st intermediate stage.

C-Vitamins component has the first place in the book of the third intermediate stage while chemical elements and minerals have the second place for the 3rd intermediate stage and the first place for book of 1st intermediate stage.

The item related to "shortage of iodine leads to enlargement of thyroid gland" has got the highest number of repetitions and gets the first place while several items do not get any repetition as the item "increase of vitamin B".

In relation to the teachers of the intermediate stage

A-generally, the teachers have information about nutritional supplements with acceptable level but the achieved mean is higher than hypothetical one that the researchers adopted, that is (%47).

B-the results show that there are no differences of statistical significance between male teachers and female teachers in the test of nutritional supplements.

In light of the results, the researchers recommend the following:

- Focus on the components of the nutritional supplements in the textbooks of the first three classes of the intermediate stage (1st, 2nd and 3rd) through redistributing the chapters on the books of the intermediate stage taking into consideration the distribution of food concepts on all three books.
- Utilization of the list of nutritional supplements components that the researchers prepared for this study when developing the textbooks of science and biology for the intermediate stage or update them.
- Third: suggestions:
  - A-conduct a similar study for other study stages as primary and preparatory ones.
  - B-make a study to measure the level of acquiring the teachers of biology and their students the components of nutritional supplements.
  - Conduct a study to integrate food-related concepts in the textbooks of intermediate stage.

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**Appendix 1: Components of Nutritional Supplements.**

<table>
<thead>
<tr>
<th>Items</th>
<th>Sub-concepts</th>
<th>Major concepts</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortage of Vit. A decreases body resistance of diseases</td>
<td>Fat- soluble vitamins A, D, E, K</td>
<td>Vitamins</td>
<td>1</td>
</tr>
<tr>
<td>Shortage of A vitamin leads to night blindness, skin dryness, weak resistance of mucous and body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A helps to strengthen vision and body resistance to diseases.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra doses of vit. A leads to poisoning since the body reserves it.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin D helps bones teeth to grow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin D works on increasing Calcium and phosphorous absorption to build bones.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shortage of vit. E causes sterility.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vitamin E decreases arteriosclerosis, cancer and activates immunity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vitamin K helps to form clot. The shortage leads to inability to stop bleeding.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---
| Water-soluble vitamins | Shortage of vitamin B leads to body disorder, nerves and anemia  
Vitamin B in the body leads to regulate work of nervous system, vision, biological activities and red blood cells.  
Vit. B increase makes the urine colour yellow.  
Vitamin C helps resisting diseases  
Lack of vitamin C results in caries of teeth, gum bleeding, chapped lips and disorder of liver functions |
|---|---|
| Animal hormones like Deca-Durabolin, Sustanon and primobolan | Persons use deca-durabolin to get bigger muscles and super power.  
When use Deca-Durabolin, Sustanon and primobolan, it may lead to damage of muscles and cancer (especially for bodybuilding and wrestling.  
Deca-Durabolin, Sustanon dysfunctions testicles.  
Persons who have Deca-Durabolin, Sustanon become infertile and nervous because it works on brain centres and affects the face and increases hair growth in different parts of the body. |
| Ca, K, P and Na. | Shortage of calcium leads to rickets, muscles convulsion and tetanus.  
Shortage of calcium leads stomach PH.  
Calcium helps milk fermentation in stomach, milk secretion and carbohydrates absorption.  
Potassium helps to improve muscles sensitivity and natural convulsion.  
potassium helps regulating osmosis pressure in cells.  
Shortage of potassium leads to body weakness and muscles and paralysis.  
Shortage of phosphorus leads to disorder of bones calcification.  
Shortage of phosphorous leads to weakness of muscles and disorder of natural growth.  
Phosphorous helps to preserve alkaline-acidic balance.  
Phosphorous is an important ingredients to balance liquids in the body.  
Sodium helps regulating osmosis pressure of the body liquids, blood plasma and water balance in the body.  
Sodium is necessary to absorb carbohydrates in the body.  
Zinc helps absorbing iron and hemoglobin formation  
Shortage of zinc leads to anemia and Wilson disease.  
Iodine is used in thyroxin hormone formation that regulates growth processes.  
Shortage of iodine leads to enlargement of thyroid gland.  
Phenylalanine leads to delay children’s mental growth  
Phenylalanine is used to produce chemical compounds to convey nerve signals.  
Methionine helps body to dispose of metabolic poisonous processes.  
Methionine maintains hair and nails and skin since it is rich in sulphur.  
Threonine helps producing collagen and minimizes fat accumulation on liver. |
| Cu, I. | Elements the body needs with little amount like Cu, I. |
Probiotics has a major role in digestive process and maintain stomach health.
- When Probiotics is taken regularly, digestive disorders decrease (vomit, nausea, stomach convulsions)
- Probiotics are found in dairy products as yogurt and prevent harmful bacteria to grow.
- Help to organize body immunity responses for infections.
- Using supplements including Probiotics help to minimize the effects of antibiotics like yogurt and milk.
- Using Probiotics supplements especially amino acids decreases urinary tracts infections, colon cancer and allergy.
- Probiotics help to compose important compounds like B and K vitamins, fatty acids that important for colon and rectum.

Brewer's yeast
- It provides strength and protection for immunity system since it includes beta-glucan and peptides and glutathione
- It has the ability to maintain intestines health through creating balance among healthy bacteria and other types of bacteria.
- It includes selenium that is very important for human body to decrease the oxidization interactions of the body.
- Helps to prevent anemia because it contains high level of iron to form hemoglobin.
- Helps to increase weight and builds muscles since it contains high level of amino acids and proteins to build up body cells.
- It is considered a good prescription for diabetic persons because it includes Chromium that helps to treat diabetes.
- It helps to prevent bones fragility, strengthen teeth since it contains high level of phosphorous, which helps to synthesize calcium in the body.

Appendix 2: Scale of teachers' information of nutritional supplements.

<table>
<thead>
<tr>
<th>Item</th>
<th>Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamins</td>
<td></td>
</tr>
<tr>
<td>shortage of vitamin A leads to:</td>
<td></td>
</tr>
<tr>
<td>a-night blindness b-scurvy c- hearing impairment</td>
<td></td>
</tr>
<tr>
<td>existence of vitamin A leads to:</td>
<td></td>
</tr>
<tr>
<td>a-healthy nervous system b-sharp vision c- construct white blood cells.</td>
<td></td>
</tr>
<tr>
<td>Vitamin A overdose leads to:</td>
<td></td>
</tr>
<tr>
<td>a-teeth caries b-hardening of arteries c-poisoning</td>
<td></td>
</tr>
<tr>
<td>4-Vitamin D in the body results in:</td>
<td></td>
</tr>
<tr>
<td>a-blood clot b-prevent skin dryness c-teeth and bones growth</td>
<td></td>
</tr>
<tr>
<td>5-shortage of E vitamin results in:</td>
<td></td>
</tr>
<tr>
<td>a-anemia b-infertility c-diabetes</td>
<td></td>
</tr>
<tr>
<td>6-vitamin E in the body results in</td>
<td></td>
</tr>
<tr>
<td>a-decreases hardening of arteries b-stop bleeding c-sharp vision.</td>
<td></td>
</tr>
<tr>
<td>7-Vitamin K in the body leads to</td>
<td></td>
</tr>
<tr>
<td>a-forming blood clot b-inability to resist diseases c-decreases the risk of cancer.</td>
<td></td>
</tr>
<tr>
<td>8-shortage of B vitamin results in</td>
<td></td>
</tr>
<tr>
<td>a-gum bleeding b-anemia c-chapped lips</td>
<td></td>
</tr>
<tr>
<td>9-vitamin B in the body leads to</td>
<td></td>
</tr>
<tr>
<td>a-prevent kidney calculi b-prevent scurvy c-increase red blood cells</td>
<td></td>
</tr>
</tbody>
</table>
### 10. Increase dose of vitamin B leads to:
- a) Bones growth
- b) The colour of urine turns light yellow
- c) Stop bleeding

### 11. Vitamin C in the body results in:
- a) Weak resistance of mucus
- b) Increases body resistance for diseases
- c) Weak body resistance

### 12. Shortage of vitamin C leads to:
- a) Disorder of body work
- b) Inability to stop bleeding
- c) Teeth caries

### 13. One of the following vitamins dissolves in water:
- a) Vitamin B
- b) Vitamin C
- c) Vitamin E

### 14. One of the following vitamins does not dissolve in fat:
- a) Vitamin C
- b) Vitamin B
- c) Vitamin A

### 15. One of the following hormones used by persons to get big muscles:
- a) Horse hormone
- b) Dica primo stone
- c) Dica primo stone

### 16. When using sustanon hormone, the result is:
- a) Activates testicles performance
- b) Convulsion of muscles
- c) Inhibit testicles work

### 17. When using decathlon hormone, the result is:
- a) Activates body immunity
- b) Damage of muscles
- c) Gum bleeding

### 18. When using prime stone hormone, the result is:
- a) Infertility
- b) Weakness of ovaries
- c) Muscles convulsion

### 19. Shortage of calcium leads to:
- a) Increases stomach acidity
- b) Stomach ulcer
- c) Weak sight

### 20. Potassium in the body leads to:
- a) High blood pressure
- b) Organize osmosis pressure in cells
- c) Blood clot

### 21. Shortage of potassium in the body results in:
- a) Muscles paralysis
- b) Skin cancer
- c) Sickle cell disease

### 22. Shortage of phosphorous leads to:
- a) Increases muscles growth
- b) Disorder of bone calcification
- c) Bone cancer

### 23. One of the following elements helps to maintain acidic and alkaline balance in the body:
- a) Sodium
- b) Zinc
- c) Phosphorous

### 24. Shortage of one of the following elements leads to muscular convulsion, overall weakness and headache:
- a) Sulfur
- b) Phosphorous
- c) Sodium

### 25. Zinc shortage in the body results in:
- a) Albuminaturia
- b) Anemia
- c) Diabetes

### 26. Shortage of iodine in the body causes:
- a) Thyroid gland enlargement
- b) Pituitary gland enlargement
- c) Adrenal gland enlargement

### 27. One of the following amino acids used to produce chemical compounds used to convey nerve signals:
- a) Phenylalanine
- b) Tryptophan
- c) Lysine

### 28. Phenylalanine disorder of children leads to:
- a) Delay of mental growth
- b) Rickets
- c) Autism

### 29. One of the following amino acids used to get rid of metabolic poisonous activities:
- a) Tyrosine
- b) Triiodothyronine
- c) Histadine

### 30. One of the following amino acids helps to produce collagen and decreases of fat accumulation on liver:
- a) Leucine
- b) Threonine
- c) Tyrosine

### 31. One of the following types of bacteria has a major role to digest food and absorption:
- a) Salmonella
- b) Cholera
- c) Probiotics

### 32. One of the following yeasts helps to protect from anemia:
- a) Bread's yeast
- b) Brewer's yeast
- c) Milk yeast

### 33. Brewer's yeast is a prescription for diabetic persons because it includes:
- a) Chromium
- b) Sodium
- c) Potassium

### 34. Brewer's yeast helps to prevent bones fragility and strengthen teeth because it includes high level of:
- a) Sulfur
- b) Iron
- c) Phosphorous