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Health Care Providers' Knowledge aboutUsing Gluten andCasein Free Diet (GFCF) for Improving Behavioral Disorders of Autistic Children: A Dietary Educational Intervention.

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Abstract: *The removal of gluten and casein from the diet of autistic children has attracted significant interest from both lay and professional quarters. It has been our experience that many* professionals *are seeking additional training in working with individuals who have* autism spectrum disorder *(ASD). This study aimed at investigating the level of knowledge and prospective of health care providers regarding Casein and gluten free diet (GFCF) and the impact of its implementation on changing autistic children physical, psychological and social symptoms. Aquasi experimental one group pre/post design was used with a convenient sample of 20 participants working in Al Basma Association for Special Needs Menoufia Governorate, Egypt. The results indicated that Majority (85%) didn't have the basic knowledge regarding Casein and gluten free diet (CFGF) and their information regarding the importance of continuity of dietary interventions is inadequate to guide parents when they apply GFCF diet with their autistic children as their total mean in pre-assessment is (12.25 ± 14.46) compared with (65.20 ± 4.63) post program intervention with highly significant difference t=13.423 and P*<0.001. *The study concluded that the dietary intervention program is effective in improving knowledge of health care providers as regard to basic knowledge and familiarity with the GFCF dietary treatment the impact of the compliance of the GFCF diet and its effectiveness in improving characteristic of ASD behaviors. These results provide initial support for allied healthcareproviders to become in force of active participation in more workshops and training program starting from screening and referring children who are eligible to GFCF diet.Moreover,The study highlights the need formore nonprofit institutions to providecare for every child through their healthcare professionals who are in position to dessiminate knowledge of appropriate early identification services for parents or primary caregivers having autistic children.*

Keywords:*health care providers,autistic children, Gultin and Casien free diet, dietry interventions*

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I. Background

Autism Spectrum Disorder (ASD) is a cluster of lifelong neurodevelopmental disorders composed of autistic disorder, Asperger syndrome, and pervasive developmental disorder not otherwise specified (Kogan et al., 2008). Autism is not a disease but a syndrome with multiple non-genetic and genetic causes (Muhle, Trentacoste&Rapin, 2004). Children who have ASD exhibit characteristic impairments in social interactions in addition to communication and restricted, repetitive, and stereotyped patterns of behavior (Couryetal. 2012and Emond et al. 2010).

The etiology of autism spectrum disorders is likely to be multi-factorial and the hypothesis of a genetic component is supported by clustering in families and higher concordance in monozygotic twins than in dizygotic twins ((Muhle, Trentacoste, &Rapin, (2004). In a minority of cases (10%), ASD may be associated with a medical condition or a known syndrome. Although ASDs are believed to be mainly genetic in origin, environmental factors may modulate phenotypic expression. It was found that autism has an important genetic component although how many genes may be involved remain unclear. The most frequently described are the structural and numerical abnormalities of sex chromosomes, anomalies of chromosome 15 and chromosome 17q21 (El-Baz, Ismael,andNour El-Din 2011). Advanced paternal and maternal age have been shown to be associated with an increased risk of having offspring with ASDs (Johnson&Myers, 2007). Regarding the relationship between autism and MMR vaccine, Muhle (2004) and Haglund (2011)reported that numerous negative studies on a possible association between autism and MMR vaccine after a report by Wakefield (1999)

regarding a possible association between autism and MMR vaccine(Muhle, Trentacoste, &Rapin, 2004 andHaglund&Källén, 2011).

With reports of the growing incidence of autism spectrum disorder, a large number of families of affected children are seeking alternative or complementary forms of treatment (Johnson etal. 2011). Various strategies have been put forward in an attempt to improve quality of life of children with autism. These have been predominantly focused on the use of psychological and educational interventions. One of the more popular interventions has been used is the elimination regimes, such as the gluten and casein freewhichalso known as (GFCF) diet. It is one of several alternative treatments for autistic children. When following this strict elimination diet, all foods containing gluten (found in wheat, barley and rye) and casein (found in milk and dairy products) should be removed from the child's daily food intake (Whiteley etal. 2010).

Some parents of children with autism believe their children are allergic or sensitive to the components found in these foods. Some seek allergy testing for confirmation. Yet, even when no allergy is confirmed, many parents of autistic children still choose to offer the GFCF diet. Among the benefits they report are changes in speech and behavior. The removal of gluten and casein from the diet of autistic people has attracted significant interest from both lay and professional quarters. Gluten- and casein-free (GFCF) diets are seen to offer a relatively uncomplicated approach to symptom management compared with some other interventions. Alongside some high-profile media reports on the success of such dietary intervention for ASCs, their use is now considered widespread (Whiteley etal. 2010).

The benefit of a gluten-free/casein-free diet is based on the theory that children with autism may have an allergy or high sensitivity to foods containing gluten or casein. According to the theoretical background children with autism, process peptides and proteins in foods containing gluten and casein differently than other people do. Hypothetically, this difference in processing may exacerbate autistic symptoms. Some believe that the brain treats these proteins like false opiate-like chemicals. Reichelt and Knivsberg (2003) concluded that peptides are excreted in increased amounts in autism and some of these are opioids. The excreted peptides may explain the social isolation as expected form opioids (Reichelt&Knivsberg, 2003). According to the Opioid-Excess Theory, some individuals suffer from inadequate production of gluten- and casein-related digestive enzymes, and increased gut permeability. Without adequate levels of digestive enzymes, peptides derived from gluten and casein leak into the blood stream because of increased gut permeability, where they circulate and eventually cross the brain–blood barrier. Symptoms of ASD are theorized to result from peptides' attaching to opioid neuro-receptors (Whiteley etal. 2010 and Mulloyetal.2010). The reaction to these chemicals, they say, leads a child to act in a certain way. The idea behind the use of the diet is to reduce symptoms and improve social and cognitive behaviors and speech. Indeed, cutting out foods containing gluten or casein can reduce or completely reverse their associated autoimmune diseases (Kendall, 2012).

A systematic review of training programs found that all programs were conducted for parents of children with autism spectrum disorders. Patterson etal. (2012) concluded that the majority of studies examined the impact of the parent education intervention on both social and communication target skills, including spontaneous verbal utterances, verbal imitation, communication turns, labeling, and appropriate social behavior.

Mulloy et al. (2010) systematically reviewed researches on the effects of GFCF diets in the treatment of Autism and suggested to be implemented only in the event of autistic children with experiences of acute behavioral changes, seemingly associated with changes in diet, and/or medical professionals confirm through testing the child has allergies or food intolerances to gluten and/or casein (Mulloy et al. 2010). Furthermore, Elderet.al (2006) studied the gluten-free, casein-free diet in autism. Although several parents reported improvement in their children, no statistically significant findings were found in the study and the need for future research was suggested . Furthermore, the results of study by Johnson, etal. (2011) did not support use of a GFCF diet in ASD and suggested a greater period of time for treatment before gains can be observed. On the other hand, Whiteley et al. (2010) reported that there is a considerable body of experimental evidence suggesting potential efficacy of a diet devoid of gluten and casein in ameliorating some of the core and peripheral symptoms of autism spectrum conditions.

Furthermore, clinicians have agreed that children with ASD receive the most benefit fromtreatment that has been initiated prior to age 4(Self, Coufal, & Parham, 2016).Consequently, if delays have beenidentified and the child has not been properly diagnosed, heor she may not receive the type of evidence-based treatmentfound to be effective for young children withautism. Thus,In 2007, theAmerican Academy of Pediatrics (AAP) outlined an ASDspecificsurveillance and screening algorithm to assist withtheidentification process by pediatrcian but due to many factors that were affectingthe consistency of ASD. screening practices such as insufficent time,lack of staffingand inadequate reimbursement (Hyman etal. 2016).Consequently, other qualified professionalswere sugessted to considerincorporating ASD-specific screenings into their clinicalpractice settings.These teams may include, but are not limited to,pediatricians, PAs, speech-language pathologist (SLPs), child psychologists, social workers ,occupational therapist [OT],and physical therapist [PT]) (Oslejskova et.al 2007). The parents can contact them before contacting aphysician.So,the accuracy of the information

regarding any theraputic interventions including GFCF diet could be provided to the family by a knowledgeable health professional which shouldresult in a referral to a physician for further evaluation and early interventions .Although the SLPs,OTs, PTs, and PAs cannot officially diagnose ASD,or prescribed any complementary therapies , theseprofessionals can provide the necessary screening informationand referral resources for families.Therfore, the current study is planned to looking at the impact of conducting an educational intervention in developing the knowledge of health care providers regarding the dietry restriction of gultin and casien from the diet of autistic children and its impact in changing physical,psychological and behavioral symptoms.

Significance Of The Study

With a prevalence rate of one in 110 people having a diagnosis of ASD, more medical, behavioral health, and allied health care professionals are needed to support this growing population. Because no single profession can meet all the needs of autistic children, multidisciplinary team is needed to take care of this special group of children which consists of medical practitioners with different specialties, nurses from different specialties, social workers and educators. Together they aim to improve overall quality of autistic children's life, academic and social skills of autistic children (Dillenburger et al. 2014). Consequently, there is a need for increasing training in ASD for all team members and keeping them updated about the new strategies for management of autism to be able to answer queriesof the parents who have autistic children. Systematic research in this area has been limited especially in Arab world Therefore, we believe that, it is important to conduct this dietary educational interventions to empower the care providers with the GFCF diet as they are in position to disseminate knowledge and answer queriesof the parents who have autistic children .In addition they obtained parents' reports and experiences based on their applications of GFCF and listen for their feedback on the effectiveness on changing their autistic children physical, psychological and social symptoms.

Aim of the study:

The aim of the present study is to investigate the effectiveness of a dietary educational program in developing knowledge of health care providers about using Gluten and Casein free diet in improving behavioral disorders of autistic children

More specifically, the study was looked at:

1. Assess knowledge of care providers about relationship of autistic disorders and GFCF diet
2. Assess care providers knowledge about the impact of implementing GFCF diet on changing autistic children physical, psychological and social symptoms.
3. Compare between pre/post assessment oftheir knowledge and experiences after conducting the dietary educational intervention (post interventions).

Hypothesis:

Based on prior research studies investigating the GFCF diet and GI symptoms common in the pediatric autistic population, we hypothesized that:

1. The knowledge of health care providers will be changed as regard to the effectiveness of this diet in changing behavioral symptoms of autistic children after implementing the program.
2. After dietary interventions, the health care providers will admit that the diet would be more effective for children with a history of physiological and/or allergy symptoms compared to those children without these physiological and/or allergy symptoms and food sensitivities.

Methods and participants:

Design: A Quasi-experimental research (one group pre-post) design was used to achieve the purpose of this study.According to LoBiondo-wood and Haber (2010)"threats to internal validity, the design is relatively strong because by gathering data at the pretest, researchers can compare the equivalence of the pre/post assessment on important antecedent variables before the introduction of the dietary educational program on developing knowledge of health care providers of GFCF diet

Subjects and setting:

The health care providerswere recruited from Al Basma Association for Disabled Children., MenoufiaGovernorate. The association is a Nonprofit Organization in Shebin al-Kom, MenoufiaGovernorate, Egypt. Their mission is "Caring for our disabled children, people with special needs and their families" and it was established in 2004 as a registered Charitable Society. The association received all children with different disabilities such as autism, mental retardation, speech problems and learning disabilities. The center has 25 health care providers working with 40 children with different disabilities. The association providing optimal care through multidisciplinary team including the psychologist, speech therapist, dietitian and psychiatrist. The association working as halfway houses received children from 8.00AM -2.00PM.The ratio of care provider to children is 1 – 3 children or one to one according to the severity and complexity of child disabilities.

Sampling Technique:
A non-probability (convenience) sample of 20 care providers out of total 25 was recruited from Al Basma Association for Disabled children to achieve the current study objectives.

Tool of the study:
A self-administered questionnaires was developed by the researchers based on an extensive review of litreature (Arabic and English)and evidance based practices consist of 2 main part as the followings:
Part one is enquired the participants about their demographic charactristics sucha as; age, level of education,their speciality,and wheather they contacted an autistic children or not.
Part 2 is a 27-items self adminsterd questionnaire was used to achieve the objectives of the study. The tool consists of a 27-items questionnaire in abase of true and false. For correct reponse given (2),Idon't know (1) while false is given (0) and includes questions regarding the following:
Care providers basic knowledge and familiarity bout the GFCF dietary treatment which includes :

- The underlying deficits of autism that causes autistic children difficulties with communication and behavior.
- Questions about the symptoms of casein and gluten syndrome?
- What are the laboratory investigations that can discover this syndrome?
- Care providers knowledge about the impact of the compliance of the GFCF diet and its effectiveness in improving characteristic of ASD behaviors (i.e. decreases in self-stimulatory behaviors, hyperactivity, sensory seeking behaviors, temper tantrums, the lining up of objects, and echolalia), physiological symptoms (i.e. decreases in bodily rash, red ring around the anus, constipation, diarrhea, and seizures), and social behaviors (i.e. increases in social responsiveness, eye contact, engagement, attention span, requesting behavior, commenting on (or naming) objects, pointing, language production, sign language production (number of signs), and imaginative play) that are typically delayed or abnormal in children with ASD.

Validity and reliability of the study tool:
To ensure the content validity of the questionnaires, the tool was revised by king Abdullah research center for translation to confirm its validity. Jury of speciality experts revised the tool to verfy that all presented items are correct and related to the purposes of the current study. Reliability of the quesionnaire was measured and Cronbach's Alpha test revealed that it is 83.0 that mean the developed quesionnaire has higher reliability .

Pilot study: As the institution have only 25 health care providers,the piolt studywas conducted on five care providers who were selected randomly and excluded from the main study sample. The aim was to evaluate the clarity of the quesitionnaires and the time needed to fill- in the questionnaires. The pilot study results indicatedthat simple modification wasrequiredin form ofparaphrasing some items of the quesionnaires.

Procedure and Description of the program:
The Data was collected during the academic year 2016/2017.The program was developed by the researchers based on review of related literature with a plan to be conducted within 6 hoursin one day.
The manger of the instituation was contacted by the researchers who explained the purpose and procedures of the study.A special invition was announced through the official website and FACEbook account of the institution about the study,its purpose and target group.
The rate of response was80% (20 out of total 25) . Informed consent was signedfrom all participants before the initiation of the program at the day of program implementation.
The subjectswere asked to fill the questionnaires before, and after the educational program. The educational training program consisted of 6 sessionsduring 6 hours at one day. Each session was 45 minutes to an hour as follows:

- Phase I. Registration and filling the pre assessment questionnairs
- Phase II. : Implementation of dietary educational intervention.
- Phase III. Post assessment and evaluation of the interventions immediately.

Description of the program

- The program aims toimprove the healthcare providers'knowledge about GFCF, asit helps the participants to learn and share their experiences with each other's specially parents of autistic children.
- The educational dietary intervention was run with all participants over a period of 6hours. Considering the availability of the care providers of children with ASD, this duration is considered short since the program was conducted in their holiday as they were not caring with children in the institution.

Contents of the sessions

- The first session (45 minutes) was used for identification, build trust and rapport relationship, and identification of their experiences of the dietary interventions.
- The educational program was ongoing from the second session until the last one, and addressed the following: :
- The autism identification session was conducted first because; as we realized that an explanation and refreshment of the participants' knowledge of underlying deficits of autism will help them to understand the causes of their child's difficulties with communication and behavior.
- What are the symptoms of casein and gluten syndrome?
- What is the needed laboratory investigation to confirmthis syndrome?
- How the casein affects the child behavior and socializations. Inaddition, the role of foods frees casein and gluten in improving these behaviors'.
- Individualizeddietarycheckups needs for each child with developing of individualized meal schedule based on child age, level of growth and development and nutritional needs. Finally, the effectiveness of dietary compliance on the children communication and social behaviors was enhanced among the participants' primary caregivers.

Teaching methods:

The Program was used the autism-specific materials includes the handout accompanies the various units covered during the group training sessions, providing factual information about autism prepared by researchers based on review of literature. Also, videos simulation which displayed autistic children behavior and others was targeting dietary interventions. Data show presentation for learned materials which was supported all the sessions, and flip chart. Participants were acquired their learning throughlistening, and active sharing their practical experiences and progress reported by parentsusing the GFCF dietary interventions with their children.

- **Ethical Considerations**

An official approval was received from the director of Al Basma Association for Disabled Children, MenoufiaGovernorate, ShebinElkom, Egypt to conduct the current study. Participants were informed about the nature and the purpose of the study. All participants were informed that their participation is voluntary and they can withdraw from the study at any time. A written consent was obtained from all participants. Confidentiality and anonymity of the collected data was assured.

Data mangement and analysis plan:

- Collected data was coded, validated, and cleaned before analysis.Analysis was done using Statistical Package for the Social Science (SPSS)22version.Frequencies and cross tabulation procedures was conducted to describe the sample.Descriptive statistics was used to describe the distribution of all study variables. Appropriate statistical test such as t-test, was conducted to determine the difference between pre and post interventions .Data was presented in different formats including tables and graphs.

II. Results

Table (1) shows that all participants (n=20) were females, their mean age was29.20 ± 5.05 and their qualification was university level.More than half of them (55%) were care providers compared by 20.0% of the participants are skills development specialist,15.0% are psychologists and only one is communication specialist and one is an autism specialist.Almost all of them didn't been informed about the children diet by the person who diagnosed them.

Table (1):Participants' distribution according to their demographic data (n=20)

Variables	No.	%
Age		
20 – 29	12	60.0
30 – 39	8	40.0
Min. – Max.	21.0 – 38.0	
Mean ± SD.	29.20 ± 5.05	
Education		
University education	20	100.0
Job		
Autism Specialist	1	5.0
communication specialist	1	5.0
Skills Development Specialist	4	20.0
Psychologist	3	15.0

Care provider	11	55.0
Have you been told about the child diet by the person who diagnosed him		
No	18	90.0
Yes	2	10.0

Table (2) shows the distribution of the participants according to their knowledge regarding foods and cereals and progressed symptoms based on using gluten free diet(n=20). As regard to the list of the cereals that contain Gluten,majority (90%) indicate that they didn't know the list of cereals except 10% know that wheat has gluten compared by 100% in the post assessment followed by 95% ,60% and, 45% indicate that oats,barley and El Raddah (Apostasy) are among the list of cereals containing gluten respectively. Regarding to the list of foods contain gluten ,95% of the participants indicated "I didn't know" compared by 75.0% reported that Starch and meat covered with flour and Alhmbugr scallops were among list foods contained gluten followed by an equal (50.0%) number of them learned that chicken, meat,vegetable factory,Almertdla and hotdogs and Abestrmpare contained gluten .Concerning the progressing signs that shows on those who follows the GF special diet, surprisingly all (100.0%) participants didn't know what are the manifestations which progressed when using GF diet in the pre assessment .while in the post interventions majority indicated it improved sleep pattern, change behavior,eye contact and less digestive problems(75.0% 65.0%,55.0% and40.0% respectively).

Table (2) Participants' distribution according to their knowledge regarding foods and cereals and progressed symptoms based on using gluten free diet (n=20)

	Before		**After**	
	No.	**%**	**No.**	**%**
List the cereals that contain Gluten				
I don`t Know	18	90.0	0	0.0
El Raddah (Apostasy)	0	0.0	9	45.0
Wheat	2	10.0	20	100.0
Oats	0	0.0	19	95.0
Semolina –Frike	0	0.0	6	30.0
Barley	0	0.0	12	60.0
Bulgur	0	0.0	7	35.0
Rice	0	0.0	2	10.0
List foods that contain Gluten				
I don`t know	19	95.0	0	0.0
Chicken, meat and vegetable factory	0	0.0	10	50.0
Almertdla and hotdogs and Albestrmp	0	0.0	10	50.0
Caramel	0	0.0	7	35.0
Starch and meat covered with flour and Alhmbugr scallops	1	5.0	15	75.0
Milk and dairy products	0	0.0	5	25.0
Rice and pasta	0	0.0	7	35.0
Progressing signs that shows on those who follows special diet				
I don`t know	20	100.0	0	0.0
Improvement in sleep	0	0.0	15	75.0
Improved behavior	0	0.0	13	65.0
Improve attention and focus	0	0.0	6	30.0
Improved eye contact	0	0.0	11	55.0
Improved speech	0	0.0	4	20.0
Less digestive disorders	0	0.0	8	40.0

Table (3) shows participants' basic knowledge of GFCF Diet with autistic children before and after the program. Only (25%) of the participants reported that they knew aboutthe new treatments in the autism historyin the pre assessment compared by 100% in the post assessment.About 35% of participants indicate that they knew that gluten and casein are of the main important protein that must be removed from the body of autistic child in the pre-assessment compared by 100% identification in the post intervention.

As regards to the participants' knowledge that digestion is not processed normally in autistic children, majority (85%) answered "No " compared by 100% reported the correct answer in postassessment. On the other

hand, the necessity of doing urine analysis for the child to confirm the diagnosis and to start the dietary interventions have not identified by all participants compared by 85% identification in the post assessment.

Concerning the time needed to get rid from gluten and casein, 100% of the participants stated "No" compared by 100%, 85% respectively stated "Yes" in the post intervention while majority reported they didn't have knowledge ofthe critical period between 14-21 days are needed to continue with the dietary program to prevent a relapse in autistic children behavior compared by all of them recognizing in the post assessment.

As regard to the necessity of nutritional and vitamin supplementation during the dietary interventions such as adding Calcium and Chlorine, only 15% and 10% reported the correct answer respectively compared by 90% and 85% reported the necessity of nutritional and vitamins insertionrespectively in post measurement.

Looking uponthe role of Yeast in causing autism, more than half (65%) stated "I don't know" in the pre-assessment whereas100% have that knowledge in post measurement.Likewise, 70% of the participants' reported that they didn't know that canned and preserved food must be avoided and the list of ingredients should be considered as it includes the items added during the production, in the pre assessment , compared by (100% and 95%) have that knowledge respectively after the program.

Table (3): Participants' basic knowledge of GFCF Diet with autistic children before and after the program (n=20)

	Before						After					
	No		Don't know		Yes		No		Don't know		Yes	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1. gluten – free / casein free (GF/CF) diet is considered of the new treatments in the autism history	13	65.0	2	10.0	5	25.0	0	0.0	0	0.0	20	100.0
2. Gluten is the exiting protein in carbohydrates	18	90.0	1	5.0	1	5.0	0	0.0	1	5.0	19	95.0
3. Casein is the main protein in milk and its dairy products	15	75.0	0	0.0	5	25.0	0	0.0	0	0.0	20	100.0
4. Gluten and Casein are of the main important protein that must be removed from the body of autism child	13	65.0	1	5.0	6	30.0	0	0.0	0	0.0	20	100.0
5. Digestion is not processed normally in autism children	17	85.0	1	5.0	2	10.0	0	0.0	0	0.0	20	100.0
6. Urine analysis must be done for the autism child before starting dietary program	20	100.0	0	0.0	0	0.0	0	0.0	3	15.0	17	85.0
7. The body get rid of Casein from 3-7 days	20	100.0	0	0.0	0	0.0	0	0.0	3	15.0	17	85.0
8. The body get rid of Gluten from 5-7 months	19	95.0	0	0.0	1	5.0	0	0.0	0	0.0	20	100.0
9. A critical period between 14-21 day since the beginning of the dietary program where a relapse in behavior for autism child	17	85.0	0	0.0	3	15.0	0	0.0	0	0.0	20	100.0
10. Autism children need nutritional items like Calcium and Chlorine	15	75.0	2	10.0	3	15.0	0	0.0	2	10.0	18	90.0
11. I have to give my child a complementary vitamin during gluten – free / casein free (GF/CF) diet	13	65.0	5	25.0	2	10.0	2	10.0	1	5.0	17	85.0
12. Yeast may cause Autism	12	60.0	1	5.0	7	35.0	0	0.0	0	0.0	20	100.0
13. Canned and preserved food must be avoided	14	70.0	0	0.0	6	30.0	0	0.0	0	0.0	20	100.0
14. List of ingredients should be considered as it includes the items added during the production	14	70.0	1	5.0	5	25.0	0	0.0	1	5.0	19	95.0
15. The child may eat seeds and natural nuts toasted in oven with some oil	14	70.0	1	5.0	5	25.0	0	0.0	1	5.0	19	95.0
16. The child can eat meat and chicken fried with grinded rusk Gluten free	16	80.0	0	0.0	4	20.0	0	0.0	0	0.0	20	100.0
17. It is recommended to use Stevia plant as a sweetener instead of the normal sugar	20	100.0	0	0.0	0	0.0	0	0.0	0	0.0	20	100.0
18. Flaxseed powder may be used as a replacement of essential fatty acids	19	95.0	0	0.0	1	5.0	3	15.0	2	10.0	15	75.0
19. A replacement of Wheat should be used in any nutritional prescription	15	75.0	0	0.0	5	25.0	1	5.0	1	5.0	18	90.0
20. Most of Autism Children are suffering from gut macrobiotic	19	95.0	1	5.0	0	0.0	4	20.0	2	10.0	14	70.0
21. Most of Autism Children are suffering from excessive fungal development	16	80.0	1	5.0	3	15.0	1	5.0	1	5.0	18	90.0
22. Autism Children are suffering from intestinal permeability	18	90.0	0	0.0	2	10.0	0	0.0	0	0.0	20	100.0
23. Autism Children are suffering from	12	60.0	1	5.0	7	35.0	0	0.0	0	0.0	20	100.0

indigestion and malabsorption												
24. Autism Children are suffering from a case known as inflammation of the intestine and weak bowel immune system	18	90.0	1	5.0	1	5.0	1	5.0	0	0.0	19	95.0
25. I think that the five nutritional groups are very important for Autism Children	17	85.0	0	0.0	3	15.0	3	15.0	0	0.0	17	85.0
26. All the Autism Children are in need for gluten – free / casein free (GF/CF) diet program and it is very effective and useful for them	10	50.0	8	40.0	2	10.0	0	0.0	16	80.0	4	20.0
27. A relapse in behavior may happen to the Autism child upon starting the gluten – free / casein free (GF/CF) diet program may last for 21 days and is considered as a sign to stop the program	17	85.0	1	5.0	2	10.0	0	0.0	9	45.0	11	55.0

Table (4) shows participants' knowledge regarding the importance of continuity of GFCF special diet in improving symptoms before and after the program. Majority (85%) didn't know the importance of continuity of GFCF diet along child's life pre intervention compared by almost all of them (95%) know the importance of continuity along life post intervention.Only 10% of the participants identify that the autistic child's behavior like Opium and Morphine addict in the pre-assessment compared by 90% reported the correct answer post intervention.

In addition , the table shows that only (30 %) of the participants' identify that improvements can be seen on the younger children than the older ones and the more acute symptoms on the autistic child the more progress happen upon using the gluten – free / casein free (GF/CF) diet program compared by 95% in post assessment . On the other hand, (80%) of the participants indicated (didn't know) about foods which are permissible and not allowed, compared by 60% were given the correct answer in post intervention assessment. Majority (70%) of them didn't know that GFCFD shouldn't be stopped and the all people who pact with the autistic child must be aware by his dietary restrictions compared by 95% of them indicate the correct knowledge post intervention.

Table (4):Participants' knowledge regarding the importance of continuity of GFCF special diet in improving symptoms before and after the program (n=20)

	Before						**After**					
	No		**Don't know**		**Yes**		**No**		**Don't know**		**Yes**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
The Autism Child must continue the gluten – free / casein free (GF/CF) diet program along his life	13	65.0	5	25.0	2	10.0	0	0.0	1	5.0	19	95.0
The Autism Child behavior may show a behavior like Opium and Morphine Addict	16	80.0	2	10.0	2	10.0	1	5.0	1	5.0	18	90.0
Improvements can be seen on the younger Autism children than the older ones	14	70.0	0	0.0	6	30.0	0	0.0	1	5.0	19	95.0
The more acute symptoms on the autism child the more progress happen upon using the gluten – free / casein free (GF/CF) diet program	16	80.0	2	10.0	2	10.0	0	0.0	1	5.0	19	95.0
Bread, Biscuits, Pasta, Groats, Semolina, Grills and rusks are allowed as a wheat replacement	16	80.0	3	15.0	1	5.0	0	0.0	8	40.0	12	60.0
Coconut, Olive, Zaatar, Coffee, Vinegar, Green and Red Tea, Soya Milk, Juices, Peanut Butter and Jam are not allowed	16	80.0	2	10.0	2	10.0	0	0.0	8	40.0	12	60.0
Meat, Fish, Eggs, Rice, Beans, Lentils, Kidney Bean are allowed during gluten – free / casein free (GF/CF) diet	18	90.0	1	5.0	1	5.0	0	0.0	1	5.0	19	95.0
gluten – free / casein free (GF/CF) diet must not be stopped at all and all people who deal with the Autism child must be aware that this child is following a dietary program	14	70.0	2	10.0	4	20.0	0	0.0	1	5.0	19	95.0

Table (5) shows that there is a highly statistical significant difference in total Mean and ±SD comparison between before and after educational interventions according to using of GFCF diet with autism spectrum disorders at ($p < 0.001$).

Table (5): Total Mean ±SD Comparison between before and after educational interventions according to using of GFCF diet with autism spectrum disorders. (n=20)

	Before	After	T	p
	Mean ± SD.	Mean ± SD.		
gluten – free / casein free (GF/CF) diet is considered of the new treatments in the autism history	0.60 ± 0.88	2.0 ± 0.0	7.094*	<0.001*
Gluten is the exiting protein in carbohydrates	0.15 ± 0.49	1.95 ± 0.22	15.387*	<0.001*
Casein is the main protein in milk and its dairy products	0.50 ± 0.89	2.0 ± 0.0	7.550*	<0.001*
Gluten and Casein are of the main important protein that must be removed from the body of autism child	0.45 ± 0.83	2.0 ± 0.0	8.396*	<0.001*
Digestion is not processed normally in autism children	0.65 ± 0.93	2.0 ± 0.0	6.469*	<0.001*
Urine analysis must be done for the autism child before starting dietary program	0.25 ± 0.64	2.0 ± 0.0	12.254*	<0.001*
The body get rid of Casein from 3-7 days	0.0 ± 0.0	1.85 ± 0.37	22.584*	<0.001*
The body get rid of Gluten from 5-7 months	0.0 ± 0.0	1.85 ± 0.37	22.584*	<0.001*
A critical period between 14-21 day since the beginning of the dietary program where a relapse in behavior for autism child	0.10 ± 0.45	2.0 ± 0.0	19.000*	<0.001*
Autism children need nutritional items like Calcium and Chlorine	0.30 ± 0.73	2.0 ± 0.0	10.376*	<0.001*
I have to give my child a complementary vitamin during gluten – free / casein free (GF/CF) diet	0.40 ± 0.75	1.90 ± 0.31	8.110*	<0.001*
Yeast may cause Autism	0.45 ± 0.69	1.75 ± 0.64	5.378*	<0.001*
Canned and preserved food must be avoided	0.75 ± 0.97	2.0 ± 0.0	5.784*	<0.001*
List of ingredients should be considered as it includes the items added during the production	0.60 ± 0.94	2.0 ± 0.0	6.658*	<0.001*
The child may eat seeds and natural nuts toasted in oven with some oil	0.55 ± 0.89	1.95 ± 0.22	6.294*	<0.001*
The child can eat meat and chicken fried with grinded rusk Gluten free	0.40 ± 0.82	2.0 ± 0.0	8.718*	<0.001*
It is recommended to use Stevia plant as a sweetener instead of the normal sugar	0.0 ± 0.0	2.0 ± 0.0	-	-
Flaxseed powder may be used as a replacement of essential fatty acids	0.10 ± 0.45	1.60 ± 0.75	8.110*	<0.001*
A replacement of Wheat should be used in any nutritional prescription	0.50 ± 0.89	1.85 ± 0.49	5.805*	<0.001*
Most of Autism Children are suffering from gut macrobiotic	0.05 ± 0.22	1.50 ± 0.83	7.310*	<0.001*
Most of Autism Children are suffering from excessive fungal development	0.35 ± 0.75	1.85 ± 0.49	7.550*	<0.001*
Autism Children are suffering from intestinal permeability	0.20 ± 0.62	2.0 ± 0.0	13.077*	<0.001*
Autism Children are suffering from indigestion and malabsorption	0.75 ± 0.97	2.0 ± 0.0	5.784*	<0.001*
Autism Children are suffering from a case known as inflammation of the intestine and weak bowel immune system	0.15 ± 0.49	1.90 ± 0.45	12.254*	<0.001*
I think that the five nutritional groups are very important for Autism Children	0.30 ± 0.73	1.70 ± 0.73	6.658*	<0.001*
All the Autism Children are in need for gluten – free / casein free (GF/CF) diet program and it is very effective and useful for them	0.60 ± 0.68	1.20 ± 0.41	2.854*	<0.001*
A relapse in behavior may happen to the Autism child upon starting the gluten – free / casein free (GF/CF) diet program may last for 21 days and is considered as a sign to stop the program	0.25 ± 0.64	1.55 ± 0.51	6.296*	<0.001*

t, p: t and p values for Paired t-test for comparing between before and after
*: Statistically significant at $p \leq 0.05$

Table (6) sheds light on the presence of a highly statistical significant difference in total Mean and ±SD comparison between before and after educational interventions according to using of GFCF diet in improving behavioral and psychological symptoms of autistic children before and after the program as P<0.001.

Table (6):Total Mean ±SD Comparison between before and after educational interventions according to using of GFCF diet in improving symptoms before and after the program (n=20)

	Before	After	t	p
	Mean ± SD.	Mean ± SD.		
The Autism Child must continue the gluten – free / casein free (GF/CF) diet program along his life	0.45 ± 0.69	1.95 ± 0.22	9.747*	<0.001*

The Autism Child behavior may show a behavior like Opium and Morphine Addict	0.30 ± 0.66	1.85 ± 0.49	9.131*	<0.001*
Improvements can be seen on the younger Autism children than the older ones	0.60 ± 0.94	1.95 ± 0.22	6.469*	<0.001*
The more acute symptoms on the autism child the more progress happen upon using the gluten – free / casein free (GF/CF) diet program	0.30 ± 0.66	1.95 ± 0.22	11.000*	<0.001*
Bread, Biscuits, Pasta, Groats, Semolina, Grills and rusks are allowed as a wheat replacement	0.25 ± 0.55	1.60 ± 0.50	8.102*	<0.001*
Coconut, Olive, Zaatar, Coffee, Vinegar, Green and Red Tea, Soya Milk, Juices, Peanut Butter and Jam are not allowed	0.30 ± 0.66	1.60 ± 0.50	6.725*	<0.001*
Meat, Fish, Eggs, Rice, Beans, Lentils, Kidney Bean are allowed during gluten – free / casein free (GF/CF) diet	0.15 ± 0.49	1.95 ± 0.22	15.387*	<0.001*
gluten – free / casein free (GF/CF) diet must not be stopped at all and all people who deal with the Autism child must be aware that this child is following a dietary program	0.50 ± 0.83	1.95 ± 0.22	7.855*	<0.001*

t, p: t and p values for Paired t-test for comparing between before and after
*: Statistically significant at $p \leq 0.05$

Table (7):Comparison between overall score of using GFCF before and after the program(n=20)

Overall score	Before	After	T	p
	Mean ± SD.	**Mean ± SD.**		
Total score	12.25 ± 14.46	65.20 ± 4.63	13.423*	<0.001*
Percent score	17.50 ± 20.64	93.14 ± 6.61		

t, p: t and p values for Paired t-test for comparing between before and after *: Statistically significant at $p \leq 0.05$

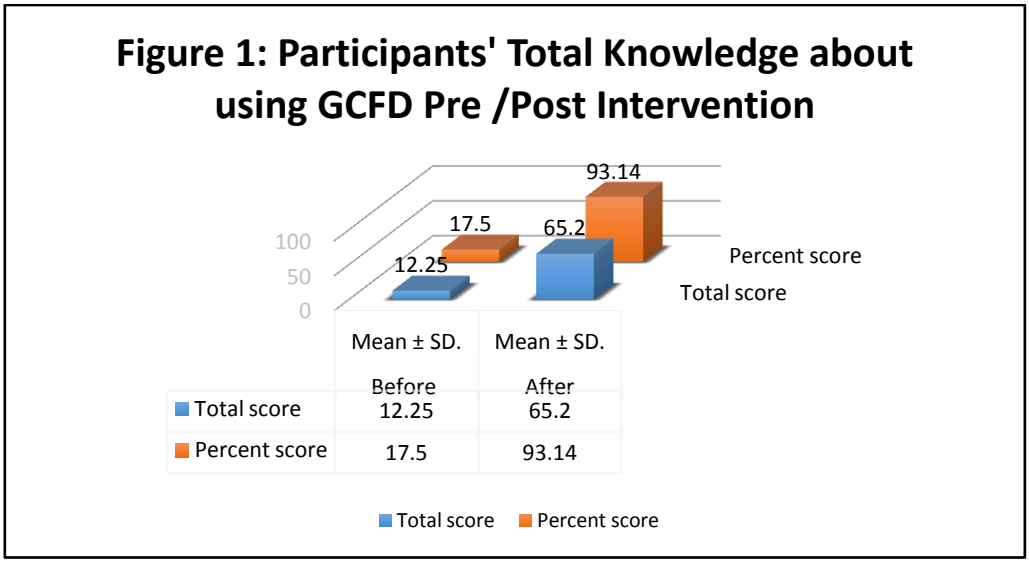

Table (7) and figure 1 show that there is a highly statistically significant difference between participants' total knowledge regarding using GCFD pre\post intervention at t =13.42 and P<0.001.

III. Discussion

There is growing interest in possible dietary involvement in the etiology and treatment of Autism Spectrum Disorders (ASD) (Cornish, 2002). Mari-Bauset etal. (2014) reportedthat GFCF diet should be implementedonly with the help of a registered dietitian, and only forindividuals who have sensitivities or allergies to thefoods that are being eliminated.The current study aimed at investigating the level of knowledge of health care providersregarding casein and gluten free diet and its effects on changing children physical, psychological and social symptoms. In fact, Caring of autistic children need multidisciplinary team work, where members of a range of professions contribute their knowledge and skills in collaborative manner in relation to autistic children's education, health, and social care contexts. Multidisciplinary team consists of but not limited to educational, medical, allied health, and social care professionals as no single profession can cover all needed competences. Medical practitioners with different specialties, nurses from different specialties, social workers and educators. Together they aim to provide the needed services that extend beyond rigid professional boundaries to improve overall quality of life, academic and social skills of autistic children (Dillenburger et al., 2014). Furthermore, Leach and Collins cited the recommendations provided by Johnson, Myers, and the Council on Children with Disabilities, which stated that diagnostic teams should collaboratively participate in the screening, evaluation, and subsequent treatment for a child with ASD. (Self., Coufal., and Parham., (2016). This is to some extent in the line with the current study as more than half of them (55%) were care providers, 20.0% of the participants are skills development specialist, 15.0% are psychologists while one

participant (5%) is communication specialist and one participant (5%) is an autism specialist. Although the care providers' team within the center includes psychologists, communication specialist and autistic specialist, still they have a poor knowledge about GFCF diet and its impact on autistic children. This may be attributed that the data collected from center dealing with children with special needs not specialized for autistic children as well as the results give evidence for the need of continuous up-to-date training for the care providers who provide care for this special group of children. In addition, the results give evidence for the need for activation of the collaboration of the multidisciplinary team members.

The gluten free, casein free (GFCF) diet is heralded by strong anecdotal parental reports to greatly improve and even "cure" symptoms of Autism Spectrum Disorders (ASD). Yet to date, little conclusive empirical evidence exists supporting its use.There have been relatively few studies on theimpact of the GFCF diet on the symptoms ofASD, and even fewer studies have been conductedwith the level of experimental rigor necessary to support the use of a GFCF diet(Mari-Bauset etal., 2014 and Mulloy et al., 2010). In addition to the current lack of evidence supportingthe GFCF diet, there are a number ofpotential limitations and health risks associatedwith this diet. The GFCF diet can be both timeand resource intensive. Families utilizing thisintervention must commit to daily meal planning and preparation while taking special care to ensure their children are still meeting their nutritional needs. Additionally, GFCF diets require significant financial resources as most foods cost almost double the amount of food containing gluten and casein (Stevens & Rashid, 2008). There is also the potential for negative social consequences, as special diets may further isolate children the ASD from their typically developing peers. GFCF diets also have been linked to a number of adverse side effects including nutritional deficiencies (Stewart et al., 2015) and suboptimal bone development (Hediger et al., 2008). On the other hand, Pennesi & Klein, (2012) reported that parents who eliminated all GF and/or CF foods reported that a greater number of their children's ASD behaviors, physiological symptoms, and social behaviors improved after starting the diet compared to children whose parents did not eliminate all GF and/or CF foods parents who broke the dietat least once per month Although there is growing interest in possible dietary involvement in the etiology and treatment of Autistic Spectrum Disorders (ASD) as well as parental reports about improving symptoms, Almost all of current study participants didn't been know or informed about the children diet by the person who diagnosed them. This give an evidence for the need of continuing education and training for all health care providers about the updated information for caring of autistic children and to be able to provide the needed, enough and complete accurate information to families of autistic children and to answer all of their concern and refer them to the needed specialties.

The current study results of the effect of the educational program support the need for the continuous training of the health care providers. It revealed that there is a highly statistical significant difference between mean score of the gluten free, casein free (GFCF) diet among study group pre\post the education program. There was a highly statistically significant relationship regarding participant knowledge before and after the program (pre and post intervention). The current results similar to those of study conducted by Fletcher, Markoulakis, and Bryden,(2013) and Alqahtani,(2012) who found that perceived positive effects as a result of using casein- or gluten-free diets or supplements included improved physical health, improved concentration that brought about better learning abilities, and a calmer behavior. Moreover, Bordini et al. (2015) study results revealed significant effect of training program on autism spectrum disorder (ASD) for Brazilian health professionals on their knowledge and clinical practice as they had referred six times as many suspected cases of ASD compared with the previous 4 months before the training.

IV. Conclusion and Recommendations

The current study concluded that health care providers working with autistic children have inadequate knowledge regarding the Gluten and Casein free diet. The dietary intervention program is effective in improving knowledge of health care providers as regard to basic knowledge and familiarity with the GFCF dietary treatment.Besides,the program empowerd them with information related to the necessiety of the compliance of the GFCF diet and its effectiveness in improving characteristic of ASD behaviors. Therfore, the study highlights the need for more nonprofit institutions to provide care for every child through their healthcare professionals who are in vital position to dessiminate knowledge of appropriate early identification services for parents or primary caregivers having autistic children. Additionally,more researches are required especially about the impact of GFCF on autistic children that include the autistic parents reports about their experiences of using the dietry restriction with their children . Registerd psychiatric and pediatric nurses need to be involved within the members of multidiscplinary team of health care providers to increase the numbers care providers and facilitate the access of parents to the nesessary information and follow up of autistic children's physical, psychological and social symptoms.

V. Research Clinical Implications

- The results of this study provide initial evidence that health care providers working with autistic children are not equipped enough with the knowledge related to Gluten and casein free diet
- Given the appropriate education and assessment tools, together with the inspiration to use them, should be reinforced, although SLPs, OTs, PTs, and Pas cannot officially prescribe the treatment for ASD, those professionals can provide the necessary screening information and referral resources for families
- The educational interventions succeed to change health care providers' knowledge in relation to food restriction of GFCF diet.

- Health care providers are in vital position to proliferate information to the autistic children and their parents.
- Health care providers should have evidence-based informationaboutcomplementary treatment services (GFCF) application so, they may feel empowered to share the results of their screenings with physicians at the earliest possible time to increase the likelihood of a positive outcome with ASD and their families.

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