Effect of Nursing Guidelines Regarding Safety Measures on Occurrence of Injuries among Adolescents with Multiple Sclerosis

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Abstract

Multiple sclerosis is a chronic disease affecting the central nervous system. Multiple sclerosis occurs when the immune system attacks nerve fibers and myelin sheathing in the brain and spinal cord. **Aim:** the current study aimed to evaluate the effect of nursing guidelines regarding safety measures on occurrence of injuries among adolescents with multiple sclerosis. **Design:** pre-posttest quasi-experimental research design was utilized in the current study. **Setting:** The study was conducted in the multiple sclerosis unit (out patients clinics) at Al-Kasr Al-Ainy Hospital. **Sample:** A purposive sample of 50 adolescents with MS aged from 12-18 years**,** free from any other central nervous system disorders and had previous exposure to injuries (falling, bruises, sprains, cuts, burns, choking, poisoning and drowning). **Tools:** Data collection was done through 1) Structured Interviewing Questionnaire Sheet, 2) Pre/post Knowledge assessment Questionnaire, 3) Pre/post Reported Practices Checklist and 4) Injures Occurrence Recording Sheet. **Results:** nearly half of selected adolescents (46%) aged from 16-18 with mean= 15.1 ± 0.6. More than three quarters (76%) of adolescents were female while 48% of them had the second rank in their families. Selected adolescents with MS suffered from fatigue, numbness and tingling, pain, thinking, and learning problems presented as 88%, 84%, 80%, and 80% respectively. 62% of adolescents with multiple sclerosis were diagnosed less than 12 months. 92% of them were hospitalized and 36% of them were due to complications. Exposed to falling, bruises, sprains, cuts, burns, choking, poisoning, and drowning (46%, 60%, 44%, 34%, 38%, 12%, 6% 10% respectively) among the selected adolescents with multiple sclerosis before intervention. Less exposed to injures as falling 24%, bruises 38%, sprains 32%, cuts 22%, burns 22%, choking 6%, poisoning 6%, and drowning 4% respectively after received nursing guidelines among the adolescence with MS. There were highly statistically significant differences before and after nursing guidelines at $P \leq 0.0^1$. **Conclusion:** The current study concluded that the adolescents with MS who receive nursing guidelines for safety measures had higher mean score of knowledge and reported practice than before with highly statistically significant differences. Adolescents after receiving the nursing guidelines for safety measures less exposed to injuries than before**. Recommendation:** Conducting nursing guidelines for safety measures for adolescents with MS and their caregivers in MS unit (outpatient clinics / inpatient section).and Applying educational program for adolescents with MS regarding developed nursing guidelines for safety measures in different community setting as schools, family health centers.

Keywords: Nursing guidelines, Safety measures, Injuries, Adolescents, Multiple sclerosis.

Introduction:

Multiple sclerosis (MS) is a condition that can affect adolescents' brain and spinal cord, causing a wide range of potential symptoms, including problems with vision, arm or leg movement, sensation or balance. It's a lifelong condition that can sometimes cause serious disability, although it can occasionally be mild. In many cases, it's possible to treat symptoms. Average life expectancy is slightly reduced for people with MS. It's most commonly diagnosed in people in their 20s and 30s, although it can develop at any age. It's about 2 to 3 times more common in women than men. MS is one of the most common causes of disability in younger adults (Nikolic, Ivancevic, Zaletel, , Rovcanin , Samardzic, & Jancic, 2020).

Adolescence is the phase of life between childhood and adulthood, from ages 10 to 19. It is a unique stage of human development and an important time for laying the foundations of good health. Adolescents experience rapid physical, cognitive and psychosocial growth. Adolescence is an important time for promoting health and preventing disease. This

growth can also occur at different rates, which can put adolescents at a higher risk for risk-taking behaviors and emerging mental health issues. During adolescence period, any health problem will affect on their health and future. From a biological perspective, adolescence should be the best time of life. Most physical and mental functions, such as speed, strength, reaction time, and memory, are more fully developed during the teenage years (Higuera-Matas, Ucha & Ambrosio, 2015).

During adolescent age, MS is known as pediatric multiple sclerosis (PMS). Pediatric Multiple Sclerosis (PMS) is a chronic inflammatory autoimmune disease of the central nervous system (CNS) and can also affect children before the age of 16 years. 3% to 10% of pediatric patients with MS present less than 16 years of age (Bunyan, Al Towaijri, Al Otaibi, Kareem, Algahtani, Al Mejally, & Almubarak, 2020). It is estimated that PMS accounts for 3-5% of the general population of patients with MS. PMS has many distinctive features the most common initial symptoms were optic neuritis (37%), sensory disturbances (31.5%), motor deficit (24.1%), cerebellar (18.5%) and brainstem lesions (16.7%), pain (9.3%), acute disseminated encephalomyelitis symptoms(1.9%), and hearing loss (3.7%) (McKay, Friberg, Razaz, Alexanderson, & Hillert, 2020).

Canada is the country with the highest rate of MS in the world, Statistics Canada reports, and while there are theories as to why that is, the ultimate cause of MS remains a mystery. Researches have demonstrated that MS occurs in most ethnic groups, including African, Americans, Asians and Latinos. Several population-based studies indicated that less than 1% of all PMS cases onset before age 10-12 years. While 2.7 to 10.5% of all PMS cases worldwide are seen in children less than 18 years of age with a rapid increase in the diagnosed female patients. Epidemiological studies showed that 300 cases per 100,000 in Italy has the highest prevalence of PMS, whereas the Orkney Islands have the highest prevalence of childhood MS also appears in female children and more than 1100 pediatric patients in Europe, North America, Iran (AlJumah, Bunyan, & Otaibi, 2020).

Multiple sclerosis is a potentially disabling disease of the brain and spinal cord. In MS, the immune system attacks the protective sheath (myelin) that covers nerve fibers and causes communication problems between brain and the rest of body. Eventually, the disease can cause permanent damage or deterioration of the nerves. Signs and symptoms of MS vary widely and depend on the amount of nerve damage and which nerves are affected. Some people with severe MS may lose the ability to walk independently or at all, while others may experience long periods of remission without any new symptoms (Jeong, Oleske, & Holman 2019).

Etiology of MS is not clearly understood and genetic predisposition but the risk factors lead to exposure to MS such as Epstein-Barr virus (EBV) has been reported in children that later developed MS. Other factors include childhood obesity, vitamin D deficiency, smoking and metabolic syndrome, genetic factors have also been implicated in pediatric onset MS (Gianfrancesco, Stridh, & Rhead 2019). Because MS affects the CNS, which controls all the actions in the body, symptoms can affect any part of the body; Muscle weakness, Numbness and tingling, Lhermitte's sign, Bladder problems, Bowel problems, Fatigue, Dizziness and vertigo, Sexual dysfunction, Spasticity and muscle spasms, Tremor, Vision problems, Gait and mobility changes, Emotional changes and depression, Learning and memory problems, Pain(Banqueri, Méndez, & Arias, 2017).

There are four types of MS; clinically isolated syndrome (CIS) is a single, first episode, with symptoms lasting at least 24 hours. If another episode occurs at a later date, a doctor might diagnose relapse-remitting MS. Relapse-remitting MS (RRMS) is the most common form. Around 85% of people with MS are initially diagnosed with RRMS. RRMS involves episodes of new or increasing symptoms, followed by periods of remission, during which symptoms go away partially or totally. Primary progressive MS (PPMS): Symptoms worsen progressively, without early relapses or remissions. Some people may experience times of stability and periods when symptoms worsen and then get better. Around 15% of people with MS

have PPMS. And Secondary progressive MS (SPMS): At first, people will experience episodes of relapse and remission, but then the disease will start to progress steadily (De Mol, Wong, Van, & Pelt, 2018).

There is no cure for MS, but treatment can slow the progression of the disease, reduce the number and severity of relapses, and relieve symptoms. Some people also use complementary and alternative therapies. Management of MS includes medical treatment, relieving symptoms during a flare, behavioral therapy, pain management, plasma exchange. Stem cell therapy. Complementary and alternative therapies may help with different aspects of MS such as using heat and massage treatment for pain, acupuncture for pain and gait, stress management to boost mood, exercise to maintain strength and flexibility, reduce stiffness, and boost mood, a healthful diet with plenty of fresh fruits, vegetables, and fiber, quitting or avoiding smoking, Rehabilitation therapy can help improve or maintain a person's ability to perform effectively at home and work including physical, occupational, speech and swallowing therapy, cognitive therapy to facilitate learning (Swedish Multiple Sclerosis Register, 2017).

Multiple Sclerosis is challenging to live with but is rarely fatal. Some severe complications such as bladder infections, chest infections, and difficulty swallowing could lead to death. MS prognosis does not always result in severe paralysis. Two-thirds of people with MS are able to walk. However, many of them will require assistance such as a cane, wheelchair, crutches, or a scooter. In MS, the mechanisms of tissue damage lead to demyelination and loss of oligodendrocyte. Because of the high degree of disability in MS patients, minimizing injury occurrence is essential for preserving quality of life. Over time, muscles can get weaker and weaker among adolescent with MS. Some people with MS find that their muscles tire more easily than usual. adolescent with MS might find that their legs might start to feel unstable or they may have trouble moving them after periods of exercise, like walking. MS causes damage to a substance called myelin, which insulates the nerves and helps them transmit signals. Myelin

damage can result in a range of symptoms, including joint pain. So accident prevention should be achieved through safety measures regarding injuries (Alroughani & Boyko, 2018).

Accidents are highly prevalent in adolescents with MS and result in a range of negative consequences, such as injury, activity curtailment, reduced quality of life, and increased need for care and time off school. The incidence of falls in adolescents with MS is estimated to be more than 50%. The consequences of falls are considerable because rate of injury is high, and fear of falling and low self-efficacy are significant problems that lead to activity curtailment. A wide range of physiological, personal, and environmental factors have been highlighted as potential risk factors and predictors of falls. However, the literature to date has largely focused on exercise-based interventions, with newer, more comprehensive interventions that use both education and exercise showing promising results. Several gaps in knowledge of falls in MS remain, in particular the lack of standardized definitions and outcome measures, to enable data pooling and comparison. Moving forward, the involvement of people with MS in the design and evaluation of programs is essential, as are approaches to intervention development that consider implementation from the outset (Coote, Comber, Quinn, Santoyo-Medina, Kalron, & Gunn, (2020).

Safety measures is so important to prevent the possibility of occurrence because MS lead to symptoms such as brain fog, depression, muscle spasticity, imbalance, extreme fatigue and vision issues – all of which can contribute to an increased risk of falling, bruises, cuts, choking, poisoning as well as other kinds of accidents and misjudgments. Nursing management should include guidelines regarding injuries and accidents among adolescents with multiple sclerosis. Safety measures should involve in all places and activities that were done by adolescents with MS. Nurses should educate adolescents with MS. Safety measures include avoiding overheated through drinking cool water to stay hydrated, taking cool or tepid showers, Wearing cooling collars, neck wraps, walking

and exercising earlier or later in the day when it's cooler and avoiding the 10 am to 2pm midday sun, Working out in an area with air conditioning (Westen, 2017).

Pediatric nurses play a key role in the care of adolescents with MS and are considered as the basis of maintaining and promoting health in these patients. Aim of nursing care is increasing control on their health and leads to positive results in activities related to health. It seems that nurses have the most important performances in health promotion for MS management requires new considerations. It should also be noted that each patient have own characteristics and is not classified in certain groups based on age, race, gender, socioeconomic status, culture, and education Nurses and other healthcare professionals working with pediatric MS patients will benefit from having common disease identifiers for quality improvement, research, and practice (Yousef, Ziaee,& Golshiri, 2019).

Pediatric nurses nowadays serve a variety of roles, ensuring the normal growth and development of children so that they can perform daily activities to its optimum level. In addition to their responsibilities regarding symptom management, drug initiation and drug monitoring in patients with MS. Pediatric nurses should involve in the development and implementation of complex patient care plans and their role continues to change as novel therapies are developed, changes to established therapies are implemented, and new concepts in patient support and compliance emerge. In the treatment of people with MS, MS pediatric nurses take on a wide range of functions that go far beyond traditional nursing roles; medication management, regular monitoring and patient education. Pediatric nurse responsible for monitoring the patients as well as carry out the therapeutic plan (Ling, Morris & Neal, 2017).

Community health nurse (CHN) has a crucial role as pivotal member of the multidisciplinary team regarding adolescents with MS. Concerning primary level of prevention, CHN should emphasize on improving quality of life among adolescents. It's important to practice exercise every day, eat well, get a good night's sleep, keep environment healthy, frequent education for early signs and symptoms of MS. Early detection is so important as early as possible through education of mothers in family health centers, school age children and school health nurses in schools and encouraging regular checkups as a main activity in secondary prevention. CHN should be provide support to adolescents with MS and their families in different community setting; schools, family health centers and MS outpatient clinics. Firstly, Home modifications should be done for adolescents with MS by family health nurses (Colleen, Harris & Halper 2016).

Community health nurse should recommend some adjustments in home as putting grab bars near shower and toilet, Creating an unobstructed path throughout the house. keeping night lights on to lead the way in darkened hallways in home. getting rid of any mess inside home and keep it organize. CHN can provide health education around MS management options. CHN should determine different community resources to refer adolescents with MS to the proper one as needed. CHN often serve as advocates for patients who need immunomodulatory treatment through interaction with managed care organizations. CHN play a key role in enhancing treatment adherence through patient education and by developing supportive relationships with patients. CHN must also monitor the patient's response to immunomodulatory therapy and having trouble adhering to treatment related side effects. CHN can make practical suggestions for managing these effects (Bjornevik, Riise, & Cortese, 2016).

Significance of the study:

The first annual conference for MS at Ain Shams University discussed the challenges that facing 40000 MS patients in Egypt. The main problem is the pricey treatment which is not affordable and that lead to the possibility of a disability which will make them difficult to talk, walk, live normally, more liable to injuries. In Egypt MS patients face a lot of burden that shedding light on the importance of early detection. In Egypt, the most recent statistics by the Ministry of Health and Population showed that MS Cases comprise

1.4% of all neurological diseases. The major problem with MS is that it usually strikes at a very early age. Other challenge that still persist are lack of awareness of the disease and the incidents of inaccurate diagnosis. The conference reported that, the earlier treatment begins, the better chances of patient has to remain in the first stage of the disease and not progress to more advanced stages (Deif, 2015) .

Epidemiological studies of MS are lacking in Egypt. MS is associated with high rates of unemployment in Egypt, the prevalence of MS in Egypt has been shown to be 13.7/100,000 and 25/100,000 in two studies, respectively, and so early assessment to manage factors that increase disability such as cognitive impairment is crucial. In Egypt, the study was done in Unit at Ain Shams University Hospitals Concluded that motor and visual symptoms were the most common manifestations of MS that lead to injurie (Zakaria, Zamzam, Abdel Hafeez, Swelam, Khater, Fahmy, Abdel, Fouad, AbdelNasser, Aref, Gadallah, 2016). The burden of MS on the patients' cognitive function is well established; MS patients show greater impairments on nonverbal intellectual ability, processing speed, and selective/focused attention, verbal-recall, and verbal fluency skills and physical skills (Zakaria,etal. 2016).

In Egypt, The burden of MS is higher than that for stroke and Alzheimer's disease because of its long duration, the higher prevalence among adolescents, and the subsequent early losses because of physical disability, fatigue, and comorbidity (El-Tallawy, Farghaly, Badry, Metwally, Shehata., Rageh , Abd El Hamed & Kandil, 2016). The result of lately door to door survey both North (Alexandria) and South (Assuit) and in Alkosier and Alkharga Oasis giving prevalence of about 25/100,000 with more familial cases around age 15 years ago the Egyptian Society with Multiple Sclerosis (Hashem, 2020).

The descriptive study that done by Hussein, Aggag, Mohamed, Tharwat & Mahmoud (2019) which carried on 400 definite adolescents with MS from Al-Azhar university hospitals and aimed to apply better management and rehabilitation to improve their quality of life. The study found that inverse relationship between adolescents' age and the degree of disability being lower in young and higher in age groups. Motor manifestations were the most common presenting manifestation, followed by optic neuritis then the sensory manifestations. About 2/3 of patients were females and 1/3 were males.

All literatures emphasized that the most important symptoms were motor and visual. These symptoms are associated with injuries that required more safety measures to avoid accidents among adolescents with MS. In Egypt, there are scarce studies conducted relevant to nursing guidelines regarding safety measures with PMS. So, conducting the current study will add to the body of nursing knowledge related adolescents with MS for pediatric nurses and community health nurses.

Also, the current study will help pediatric and community health nurses to improve their practices in inpatient sections and outpatients clinics, schools, family health centers concerning safety measures and accidents prevention for those adolescents with MS through assessment of risks, factors, surrounding environment and demonstrate proper nursing care according to injuries and providing health education sessions for caregivers about methods of accident prevention in different environment (home, school) that surround adolescents with MS.

In addition, the current study will add to the balk of nursing research regarding MS and occurrence of injuries. Hence, the current study was under taken to evaluate effect of nursing guidelines regarding safety measures on occurrence of injuries among adolescents with MS. Hopefully, the results will set a standard to improve the knowledge and practices for adolescents and prevention from injuries among adolescents. Moreover, providing guidance and recommendations that should be reflected in nursing practices.

Operational definition:

Nursing Guidelines Regarding Safety Measures: means activities that controlled injures to preserve the health and well-being and absence of unreasonable risk under the

occurrence of hazards resulting from functional insufficiencies such as falling, bruises, sprains, cuts, burns, choking, poisoning and drowning among adolescents with multiple sclerosis.

Aim of the study:

The current study aimed to evaluate the effect of nursing guidelines regarding safety measures on occurrence of injuries among adolescents with multiple sclerosis.

Research hypotheses:

H1: adolescents who receive the nursing guidelines regarding safety measures would have higher mean score of knowledge and reported practices rather than before.

H2: adolescents who receive the nursing guidelines regarding safety measures would less exposed to injuries rather than before.

Materials and methods

Research design:

One group pre-post test quasi-experimental research design was utilized to achieve the aim of the current study. A quasi experimental design is one type of experimental design that is very similar to the true experimental design except there is lose one criterion as randomization (Burns & Grove 2017).

Setting:

The study was conducted in the MS unit at Al-Kasr Al-Ainy that considered the first unit in Egypt that gives health services for patients with MS. The current study was done at outpatient clinics section in MS unit. This unit included two sections First section is outpatient clinics for all pediatric patients for diagnosis, follow up and treatment. outpatient clinics included different clinics for different specialties; neurology, ophthalmological, urinary disorder, physiotherapy and andrology and sexual health. In addition to education room for patients, assessment room for newly cases and workshop room for specialists. The current study was done in education room which contained seats, proper light, and suitable size widow. The second section of MS unit is inpatient which included eight rooms for received children need to admission.

Subjects:

A purposive sample of 50 adolescents with MS and receive periodic care and follow up in MS unit participated in the current study. The researchers determined 6 months to collect the required sample. The selected sample met following inclusion criteria:

- Age from 12-18 years**.**
- Free from any other CNS disorders as Cerebral palsy, brain atrophy.
- Having previous exposure to injuries (falling, bruises, sprains, cuts, burns, choking, poisoning and drowning)

Data collection tools:

The required data was collected through the following tools:

1- Structured Interviewing Questionnaire Sheet: It was developed by the researchers based on the recent relevant literature review. It consisted of 3 parts.

Part I: **Demographic data of mothers**: It consisted of 4 questions; age, level of education, occupation and place of residence.

Part II: **Demographic data of adolescents**: It covered 4 questions which included age, gender, ranking between sibling and school attendance.

Part III: **Medical history for adolescents**: It included 15 questions about signs and symptoms, diagnosis, actual time for diagnosis, previous hospitalization, causes of hospitalization and risk factors.

2- Pre/post Knowledge Assessment Questionnaire: It designed by the researchers after extensive review of the related literature. It included adolescents' knowledge regarding MS. It included 25 questions related to disease; definition, signs and symptoms, types of MS, factors, important of early treatment, consequence of MS, causes of MS and role.

3- Pre/post Reported Practices checklist: It designed by the researchers based on the recent relevant literature review. It included 25 questions reported practice about safety measure in different places as bathroom, kitchen, home, feeding, school, club, street and activities.

4- Injuries Occurrence Recording Sheet: It was developed by the researchers. It included 8 items (falling, bruises, sprains, cuts, burn, chocking, poisoning, drowning). It was conducted to assess occurrence of injuries before band after the nursing guidelines.

Scoring System:

Pre/post Knowledge Assessment Questionnaire: Total number of the questions

was 25. It included 25 questions related to disease (20 marks); definition, signs and symptoms, types of MS (20 marks), factors (10 marks), important of early treatment (20 marks), consequence of MS (10 marks), causes of MS (10 marks) and role (10 marks). Each complete right answer was given 2, incomplete right answer was given 1, and wrong answer was given zero. Total score was 50. The adolescent had satisfactory level of knowledge when the adolescent responses were ≥ 60 % (30 - 50 scores). The adolescent had unsatisfactory level of knowledge when obtained < 60 % (0 > 30 scores).

5- **Pre/post Reported Practices checklist:** Total number of the questions was 25. It included 25 questions reported practice about safety measure in different places as bathroom (15 marks), kitchen (15 marks), home (15 marks), feeding (15 marks), school (10 marks), club (10 marks), street (10 marks) and activities (10 marks). Each complete right answer was given 2, incomplete right answer was given 1, and wrong answer was given zero. Total score was 50. The adolescent had satisfactory reported practices when the adolescent responses were ≥ 60 % (30 - 50 scores). The adolescent had unsatisfactory reported practices when obtained < 60 % (0 > 30 scores).

Validity and Reliability:

Content validity for the structured interviewing questionnaire was established by panel of experts consisting of three experts in the field of pediatric nursing, community health nursing and neurological medicine to test the content validity of the designated tool. Reliability of the tools was performed to confirm the consistency of the tools and reflect stability across administration. The reliability coefficients' alpha was 0.72.

Procedure:

Official permission was obtained from the director of MS unit at Al-kaser Al- Ainy Hospital to conduct the current study. and permission from the head of outpatient clinics in first floor was obtained. All adolescents and their mothers were inviting to participate in the study. The purpose and the nature of study were explained to each adolescent with MS and their mothers individually. An individual interview was conducted with each adolescent and his / her mother in the study group to take demographic

data (tool 1) and pretest obtained by the researchers to assess adolescent's knowledge (tool 2) and reported practices (tool 3). Then the researchers were assessing adolescents injures occurrence through (tool 4) within 30 – 45 minutes for each adolescent with MS and adolescent's mother.

The researchers explained nursing guidelines for safety measures for adolescents with MS in the study group at two sessions (each one was 30-45 minutes) on an individual basis and sometimes for a group ranged from 3 to 5 of adolescents with MS. The first session included knowledge about MS such as disease, types, factors, important, consequence, causes and role. The first session was done before follow up time. The second session which included reported skills regarding safety measures for adolescents in different places which included bathroom, kitchen, home, feeding, school, club, street and activities. The second section was done after finishing follow up. The time between the first and the second session was about 3-4 hrs. All sessions were done in health education room.

The second session included the reported practices regarding safety measures. Then, the nursing guidelines regarding safety measures were applied by using videos and printed pictures in booklets and distributed on the selected sample. After two weeks the researchers fulfilled the post test for the selected adolescents to assess adolescent's knowledge and reported practices after receiving nursing guidelines for safety measures (tool 2 & 3) during follow up in outpatient clinic. Similarly, in the follow up for adolescents after one month the researchers measured injures occurrence by used (tool 4) to assess occurrence of injuries such as (falling, bruises, sprains, cuts, burns, choking, poisoning and drowning). Data collection was conducted over eleven months extending from March 2019 till January 2020.

Ethical Considerations:

An official permission was obtained from the director of MS unit at Al- Kasr Al-Ainy Hospital. The researchers informed each participant about the purpose, nature and benefits of the current study. Before distributing the sheet, researchers explained the aim of the study, duration of the study and the data collection tools.

The researchers emphasized that the participation in the study was entirely voluntary

and their rights for withdrawal during the study at any time were secured, anonymity and confidentiality was assured through coding the data, data collected was used for the purpose of the study only. All adolescents and their mothers received written and verbal explanations about the nature of the study; voluntary participation; what study involvement would entail; anonymity and confidentiality issues; and, the right to withdraw from the study at any time without any effect on their child's care.

Pilot study:

A pilot study was carried out on 10% of the study sample (5 adolescents with MS) to assess the feasibility of data collection tools as well as clarity and estimate the average time needed for data collection. The pilot results were included in the study because there was on modification of the data collection tools.

Statistical Analysis:

A compatible personal computer (PC) was used to store and analyze data. The Statistical Package for Social Studies (SPSS), version 21.0 was used. Data were coded and summarized using mean, standard deviation and crosstabs for quantitative variables, and percent for qualitative variables. The collected data were tabulated, and summarized. Data was computerized and analyzed using appropriate descriptive and inferential statistical tests. Qualitative data were expressed as frequency and percentage. A comparison between qualitative variables was carried out by using parametric Chi square test. Comparison of means was performed using paired-sample t-test. Correlation among variables was done using Pearson correlation coefficient. Level of significance at $p<0.05$ & 0.001 were used as the cut of value for statistical significance.

Results

Table (1) reveals that 46% of studied adolescents aged from 16-18 with mean= 15.1 ± 0.6. More than three quarters (76%) of adolescents were females while 48% of them had the second rank in their families. More than half (54%) of adolescent spent half time in their schools and 46% of them went to their school full time. Regarding to place of residence, 78% of mothers lived in rural areas while only 22% of them lived in urban areas.

Table (2) indicates that, 46% of mothers aged from 30 to 40 years old. As regards educational level of the studied mothers, less than half of them (48%) had a diploma education and 10% of mothers finished higher education. Regarding occupation of the mothers, 86% were housewives and only 14% of them were working.

It is clear om table (3) that 88%, 84%, 80% & 80% of the selected adolescents with MS respectively had fatigue, numbness and tingling, pain, thinking, and learning problems. 76% had mobility problems and 66% of adolescence complained from bladder problems. As well as 50% of them suffered from depression and swallowing difficulties and 44% of them from adolescence had muscle spasms, stiffness and weakness. More than One third (36% & 34% respectively) of them had vision problems and bowel problems.

Table (4) shows that, 62% of adolescents with MS were diagnosed less than 12 months. Majority of the study sample (92%) of them were hospitalized and 78.2 % of them were hospitalized due to complications. On the other hand, 40% of adolescents suffered from vitamin D deficiency as a risk factor for MS.

Table (5) highlights that all knowledge related MS (disease, types, factors, importance, causes and roles) except consequence had highly statistically significant differences between total mean scores of the selected adolescents' knowledge regarding MS before and after nursing guidelines related safety measures (p= 0.01, p= 0.02, p= 0.02, p=0.02, p=0.02, p=0.01 respectively).

Table (6) reveals that, highly statistically significant differences were detected between total mean scores of all reported practices for the selected adolescents with MS before and after guidelines safety measures at P < 0.01.

Table (7) indicates that 78% of the selected adolescents with MS had an unsatisfactory level of knowledge before receiving nursing guidelines related safety measures while 22% of them had satisfactory level of knowledge compared to more than 70% of them had satisfactory level of knowledge after receiving safety measures guidelines. Highly statistically significant

differences were detected between level of knowledge for the selected adolescents with MS before and after receiving nursing guidelines related safety measures at P < 0.01.

Table (8) reports that 76% of adolescents with MS had an unsatisfactory level of reported practices before receiving nursing guidelines related safety measures compared to 80% of them had satisfactory level of reported practices after receiving nursing guidelines related safety measures. Highly statistically significant differences were detected between reported practices before and after receiving nursing guidelines related safety measures among the selected adolescents with MS (p<0.01).

Table (9) indicates that occurrence of injuries among the selected adolescents with MS before received nursing guidelines related safety measures exposed to injuries such as falling, bruises, sprains, cuts, burns, choking, poisoning, and drowning (46%, 60%, 44%, 34%, 38%, 12%, 6% 10% respectively). On the other hand, less exposed to injures as falling

24%, bruises 38%, sprains 32%, cuts 22%, burns 22%, choking 6%, poisoning 6%, and drowning 4% respectively after received nursing guidelines among the adolescence with MS. There were highly statistically significant differences before and after nursing guidelines at p ≤ 0.01.

Table (10) indicates that, there was no statistically significant positive correlation between adolescents age and total mean score of knowledge before receiving nursing guidelines related safety measures at r=0.905, p=0.170. On the other hand, there was statistically significant positive correlation between adolescents age and total mean score of knowledge after receiving nursing guidelines related safety measures at p ≤ 0.05.

It is evident from table (11) that, there was a high statistically significant positive correlation between place of residence of selected adolescents with MS and total mean score of knowledge before and after receiving nursing guidelines related safety measures at p ≤ 0.01.

Table (1): Percentage distribution of demographic data among the selected adolescents with MS (n=50)

Demographic Data of Adolescents	No.	%
Age(in years)		
12 -	10	20.0
14 -	17	34.0
16 - 18	23	46.0
Mean ± SD	15.1±0.6	
Gender		
Female	38	76.0
Male	12	24.0
Rank within the family		
First	14	28.0
Second	24	48.0
Third or more	12	24.0
School attendance		
Full time	23	46.0
Half school time	27	54.0
Place of residence		
Rural	39	78.0
Urban	11	22.0

Table (2): Percentage distribution of demographic data among the mothers of the selected adolescents with MS (n=50)

Demographic Data of Mothers	No.	%
Age (in years)		
20 -	19	38.0
30 -	23	46.0
40 -50	8	16.0
Mean ± SD	33.70±6.37	
Educational level:		
Illiterate	15	30.0
Read and write	6	12.0
Diploma education	24	48.0
Higher education	5	10.0
Occupation:		
Working	7	14.0
House wife	43	86.0

Table (3): Percentage distribution of signs and symptoms among the selected adolescents with MS (n=50)

Signs and Symptoms	Yes		No	
	No.	%	No.	%
Fatigue	44	88	6	12
Vision problems	18	36	32	64
Numbness and tingling	42	84.	8	16
Muscle spasms, stiffness and weakness	22	44	28	56
Mobility problems	38	76	12	24
Pain	30	80	20	40
Thinking and learning problems	30	80	20	40
Depression and anxiety	25	50	25	50
Bladder problems	33	66	17	34
Bowel problems	17	34	33	66
Speech and swallowing difficulties	25	50	25	50

Table (4): Percentage distribution of time of diagnosis, hospitalization and risk factors among the selected adolescents with M S (n=50).

Variables related MS	No.	%
Time taken for Diagnosis (months)		
< 12 months	31	62.0
12 - 18 months	5	10.0
18 - 24 months	14	28.0
Previous hospitalization:		
Yes	46	92.0
No	4	8.0
Causes of previous hospitalization (n= 46)		
Treatment	10	21.8
Complications	36	78.2
Risk factors for MS		
Infection	3	6.0
Obesity	10	20.0
Vitamin D deficiency	20	40.0
Metabolic syndrome	9	18.0
Heredity	8	16.0

Table (5): Comparison between total mean scores of Knowledge among the selected adolescents with MS before and after receiving nursing guidelines related safety measures (n=50).

Knowledge related MS	Before Nursing Guidelines Mean ± SD	After Nursing Guidelines Mean ± SD	t	P value
Disease (20 marks)	8.3±1.1	14.3±2.2	0.71	0.01*
Types (20 marks)	9.3±3.7	13.2±1.2	0.51	0.02*
Factors (10 marks)	5.3±2.3	8.3±3.4	0.55	0.02*
Importance (20 marks)	10.2±1.4	15.2±1.2	0.63	0.02*
Consequence (10 marks)	6.3±3.1	7.3±3.2	0.09	0.07
Causes (10 marks)	3.3±1.5	7.9±1.4	0.66	0.02*
Roles (10 marks)	5.3±1.1	8.3±3.2	0.93	0.01*

* Highly statistically significant P < 0.01

Table (6): Comparison between total mean scores of reported practices among the selected adolescents with MS before and after nursing guidelines related safety measures (n=50).

Reported Practices	Before Nursing Guidelines Mean ± SD	After Nursing Guidelines Mean ± SD	t	P
Bathroom (15 marks)	8.1±2.1	13.3±2.2	0.33	0.001*
Kitchen (15 marks)	9.1±1.5	11.2±1.2	0.٥٥	0.03*
Home (15 marks)	3.3±2.3	9.3±3.6	0.٤٣	0.0٠2*
Feeding (15 marks)	9.3±1.7	12.2±1.2	0.41	0.02*
School (10 marks)	4.3±1.4	7.7±1.2	0.82	0.02*
Club (10 marks)	6.3±2.5	10.3±3.2	0.91	0.01*
Street (10 marks)	4.3±1.7	9.2±1.4	0.56	0.02*
Activities (10 marks)	5.2±2.1	8.3±3.2	0.63	0.01*

* Highly statistically significant P < 0.01

Table (7): Comparison between total level of knowledge before and after receiving nursing guidelines related safety measures among the selected adolescents with MS (n=50)

Total Level of Knowledge	Before Nursing Guidelines		After Nursing Guidelines		X^2	P
	No.	%	No.	%		
Satisfactory	11	22	35	70	0.31	0.02*
	50.3±2.1		57.3±3.2			
Unsatisfactory	39	78	15	30	0.42	0.03*
	34.3±1.7		47.2±1.2			

* Highly statistically significant P < 0.01

Table (8): Comparison between level of reported practices before and after receiving nursing guidelines related safety measures among the selected adolescents with MS (n=50).

Level of reported practices	Before Nursing Guidelines		After Nursing Guidelines		X^2	P
	No.	%	No.	%		
Satisfactory	12	24	40	80	0.91	0.001*
	53.3+2.1		59.3+3.2			
Unsatisfactory	38	76	10	20	0.37	0.003*
	42.3+2.7		44.2+3.2			

* Highly statistically significant p < 0.01

Table (9): Comparison between occurrence of injuries before and after nursing guidelines related safety measures among the selected adolescents with MS (n=50).

Types of injuries	Occurrence of Injuries				X²	P
	Before Nursing Guidelines		After Nursing Guidelines			
	No.	%	No.	%		
Falling	23	46	12	24	25.92	0.00*
Bruises	30	60	19	38	17.00	0.00*
Sprains	22	44	16	32	18.00	0.00*
Cuts	17	34	11	22	20.48	0.00*
Burns	19	38	11	22	18.00	0.00*
Choking	6	12	3	6	38.72	0.00*
Poisoning	3	6	3	6	36.23	0.00*
Drowning	5	10	2	4	42.32	0.00*

* Highly statistically significant $p < 0.01$

Table (10): Correlation between age and total mean scores of knowledge before and after receiving nursing guidelines related safety measures among the selected adolescents with MS (n=50).

Total mean score of Knowledge	Age (in years)			r.	P
	12 >14 Y.	14 >16 Y.	16-18 Y.		
	Mean ± SD	Mean ± SD	Mean ± SD		
Before Nursing Guidelines	3.147±0.820	3.315±0.989	1.500 ±0.534	0.905	0.170
After Nursing Guidelines	10.329±4.219	4.900±4.043	10.438±1.752	0.801	0.036*

* Correlation is significant at $P \leq 0.05$

Table (11): Correlation between place of residence and total mean score of knowledge before and after receiving nursing guidelines safety measures (n= 50).

Total mean score of Knowledge	Place of Residence		r.	P
	Rural (n=39)	Urban (n=11)		
	Mean ± SD	Mean ± SD		
Before Nursing Guidelines	22.02±4.4	26.5±6.4	0.476	0.000**
After Nursing guidelines	4.9±1.9	6.09±2.1	0.417	0.003**

** Correlation is significant at $P \leq 0.01$, two-tailed.

Discussion

Concerning the demographic data, it was evident from the current results that, majority of studied adolescents with MS were 16 < 18 years. The mean age of selected adolescents with MS 15.1± 0.6 was years. The current result agreed with Jean and Jennifer (2018) who assured that majority of PMS (94%) occurred during adolescence from 11:16 years and estimated 2.7 % to 5.4% of all pediatric patients with MS experience their first attack before 18 years of age. From the researchers' point of view, the result may be congruent with all literatures that emphasize the age of PMS.

The current study revealed that more than three quarters of the selected adolescents with MS were females. This result was similar to Kennedy, O'Connor, Sadovnick, Perara, Yee and Banwell (2018) who reported that female to male ratio 2:1 for children over 10 years of pediatric MS increases with age. Also, Premelc et, al; (2020) reported that a higher incidence of traumatic injuries as an impact of MS occurred in females 74.6% than males 46.7%. Regarding to school attendance, more than half of selected adolescents with MS attended half time and more than two fifth attended full time.

The current result was contrasted with MacAllister, Belman and Milazzo (2017) who studied 37 teens with MS and found that 59% had impairment on one or more tasks affecting their school function such as 30% difficulties with complex attention , 19% language and 35% had significant cognitive impairment with poor performance on at least two school tasks. The researcher's opinions refer to the high prevalence of MS among females more than males. Also, school attendance of adolescents with MS should be affected as a result of MS, its episodes, medication side effects, periodically follow up and complication.

Furthermore, the current result showed that, more than two fifth of the mothers were aged from 30-40 years old, while the minority of them were more than 40 years old with mean age = 33.70± 6.37 and majority of mothers were housewives and only nearly quarter of them were working outside homes. The current result agreed with Katooa and Shahwan (2017) who studied 122 mothers who having chronically ill children and aged from 25 to 35 and more than half of the participants were employed. From the researchers' point of view, the similarity of mothers' age may be related to woman's peak reproductive years are between the late teens and early 30s.

As regards educational level of the studied mothers, it was found that less than half of them had a diploma education and only low percent of them finished higher education. Boston Children Hospital (2020) studied heterogeneous effects of less educated mothers' further education during early childhood on children's educational performance in adolescence and stated that two opposing views were presented about it in the literature. Researchers' point of view suggested that such enrolment helps mothers to enhance their economic, social, human, and cultural capital and the mothers have less time to focus on their children's upbringing. Hence it affects negatively on not only children's education but also their health and wellbeing.

Regarding work of the mothers in the current study, the majority of them were housewives and only about quarter of mothers were working. This current result contradicted with Nikore (2019) who found 73.2% of mothers in rural areas and 60.7% of mothers in urban areas were employees which effect on the care for their children. This result could be interpreted as, almost of women are housewives that may be related to Egyptian culture that did not support women's work when she has children especially in case of children illness.

Regarding to place of residence in the current study, more than three quarters of mothers lived in rural areas while only one fifth of them lived in urban areas. The current result contradicted with Nikore (2019) who found 73.2% of mothers in rural areas and 60.7% of mothers in urban. From the researchers' opinions, this contradicting may be due to that the most of patients come to Manial hospital were from rural areas. The rural areas did not include health services for patients with MS.

Furthermore, the current result showed that majority of the selected adolescents had fatigue, numbness and tingling, pain, thinking, and learning problems. More than three quarters of them had mobility problems and more than three thirds of adolescents suffered from bladder problems. half of adolescent had speech and swallowing difficultiesy and more than two fifth of them had muscle spasms, stiffness, weakness and more than One third of them had vision problems and bowel problems. The current results were in agreement with Fisher et, al; (2020) who reported that the most common symptoms in adolescents with MS were sensory (15–30%), motor (30%), and brainstem dysfunction (25-41%).

In addition, Boyd & MacMillan, (2015) documented that common symptoms of MS in adolescents included weakness, exhaustion blurry vision, numbness, tingling or other change in sensation, loss of balance or coordination, changes in bladder or bowel function, dizziness, difficulty with concentration, trouble learning and remembering information, poor judgment, short attention. This congruency may be due to a logic progress, consequences and complications of MS among adolescents.

In relation to MS diagnosis, the current study results found that less than two thirds of adolescents with MS were diagnosed < 12 months and only 28% of them diagnosed from 18 to 24 months. The result was in same line with Belman, Lauren and Krupp, (2019) who reported that 20.6% of adolescent with MS diagnosed in 10 months and 67% of them diagnosed within 18

months. This agreement may be proved that the MS is difficult for diagnosis and taking time that contribute in poor prognosis of MS.

Regarding to previous hospitalization, the vast majority of adolescents with MS had previous history of hospitalization and more than two thirds of them hospitalized with complications. The current result was congruent with Lavery, Brenda and Waldman (2018) who reported that 73% of adolescents with MS were hospitalized due to MS complications in United states. This agreement reflects the occurrence of complications regardless availability and level of health services. The frequent occurrence of episodes that lead to hospitalization may be different from country to other according to availability, level of health services, type of MS and compliance of patient with treatment regimens.

The current result revealed that statistically significant differences between total mean score of adolescent's knowledge before and after nursing guidelines related safety measures. The current result was in the same line with Razaz et, al; (2019) who assess the factors associated with poor adjustment to adolescents with MS. They found limited knowledge and understanding of MS were the main factors associated with poor adjustment and reported that their statistically significant differences about important of children information and lack of information for MS to avoid risk of complications at p ≤ 0.05. From the researcher's opinions, this similarity proved that information and knowledge are the key issue that guide practices and increase awareness of people toward chronic ill.

The current result reported that there were statistically significant differences between total mean score of reported practice for adolescents with MS before and after nursing guidelines related safety measures at p < 0.01. The current result agreed with with Ellenbecker, Samia and Cushman (2019) who studied patient safety and quality in home health care and found that the adolescents with MS gain changes in their roles after diagnosis, which may be gradual changes and it is considered a common challenge for caregivers is balancing the needs of caring for their adolescents with MS and family responsibilities and social obligations at p< 0.05. This agreement may be proved that the

importance of safety program in different setting not only home. Caregivers play a crucial role to be aware regarding safety measures immediately after diagnosis to avoid injuries and accidents.

The current result reflected that there were more than two thirds of adolescents with MS had satisfactory level of knowledge after receiving nursing guidelines related safety measures. This current result congruent with Amer et, al; (2019) who found high statistically significant differences between knowledge scores for adolescents about MS before and after receiving health education. Therefore, more intensified awareness programs among population are necessary to ensure reliable information reach the public in order for early detection and management of this serious disease. This congruency proved that information and knowledge can be easily improved after obtaining health education or instructions. It is a great chance to enhance the level of knowledge among adolescents with MS.

Majority of selected adolescents with MS had satisfactory level of reported practices after receiving nursing guidelines related safety measures. Statistically significant differences were detected between adolescents' reported practices before and after receiving nursing guidelines related safety measures at (p<0.01). The result was in agreement with National Multiple Sclerosis Society (2018) that reported 80% of teenagers with MS can face the reality that they are unable to continue with all the activities they enjoy and health care system support them by teaching and care to continue daily activities that they enjoy. Researchers' opinions refer this agreement to the selected practices may be according to more needed skills from the adolescents with MS.

It was found from the current result that the selected adolescents with MS exposed to injuries as falling, bruises, sprains, cuts, burns, choking, poisoning and drowning before received nursing guidelines related safety measures while, after received nursing guidelines safety measures the adolescents with MS less exposed to injuries and there was statistically significant difference before and after nursing guidelines safety measures at P ≤ 0.05. The current result was contrasted with Sekulic, Prus and Zaletel (2020) who emphasized

that lowest prevalence of injuries occurred after safety program.

The current result indicated that there was statistically significant positive correlation between adolescents' age and total mean score of knowledge after receiving nursing guidelines related safety measures at P≤ 0.05. The current result agreed with Rattan and Sumeriya (2020) that studied the knowledge and attitude of the adolescent students and reported that 60% was found in average score of knowledge and 40% obtained good score and found significant correlation between their knowledge score and adolescent age at p=≤ 0.05.

It was evident from the current study results that there was a high statistically significant positive correlation between total mean score of knowledge for adolescents with MS before and after receiving nursing guidelines related safety measures and their place of residence at p=≤ 0.01. The current result was congruent with Erfani et, al; (2020) who documented that the significant correlation regarding the living place of the adolescents and knowledge at (P< 0.01).

When compared to baseline measures, the current study's findings validated the stated hypotheses that there was a highly statistically significant differences in the occurrence of injuries among adolescents with MS after intervention.

Conclusion:

The current study concluded that the studied adolescents with MS who received nursing guidelines for safety measures had higher mean score of knowledge and reported practice than before with highly statistically significant differences. As well as, adolescents after receiving the nursing guidelines for safety measures less exposed to occurrence of injure than before with highly statistically significant differences. The study assured that the nursing guidelines were with highly statistically significant effective in enhancing adolescent's knowledge and improving their practical skills while caring to themselves. They also concluded that the safety measures guidelines were with highly statistically significant effective in decreasing the occurrence of injures for the studied adolescent with multiple sclerosis.

Recommendations:

- Conducting nursing guidelines for safety measures for adolescents with MS and their caregivers in MS unit (outpatient clinics / inpatient section).

- Applying educational program for adolescents with MS regarding developed nursing guidelines for safety measures in different community setting as schools, family health centers.

- Nursing guidelines for safety measures should be included in a routine protocol of nursing care for adolescents with MS at outpatients clinics in MS units.

- Further researches are needed regarding the strategies that should be followed for preventing injuries among adolescents with MS and their caregivers in different community settings.

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