Effects of Argan Spinosa Oil in the Treatment of Diaper Dermatitis in Infants and Toddlers: A Quasi-Experimental Trial

Study Date:

1- February- 2018 Till 1-June-2019

Methods

3.1 Introduction

This chapter describes the methods and the procedures of the study including the study design, settings, target population, sampling, and required sample size. The method of data collection and data analysis are presented in this chapter as along as with the used instruments. Finally, Ethical considerations and highlighted statistical analysis are presented.

3.2 Study Design

A triple-blinded, quasi-experimental trial was conducted to compare the effect of the traditional medicinal product of Argan Spinosa Oil on the speed up of the healing process and alleviation of the symptoms with that of topical hydrocortisone 1% ointment on cases of DD among Jordanian infants and toddlers younger than two years old. Furthermore, this study aimed to investigate variables that might increase the development of DD. The study was blinded from the physician, treating caregivers/nurses and data analyst, also the study participant did not know in which group they were.

3.3 Study Setting

The study was conducted at one university affiliated teaching hospital and two governmental affiliated teaching hospitals with their pediatric outpatient clinics and affiliated health care centers of Jordanian Ministry of Health (JMOH).

The researcher chose these hospitals because they are all known teaching hospitals in Irbid, and being in the same region decreases the effect of confounding variables that may threaten the internal validity of the study.

Irbid governorate was chosen because it is geographically accessible to the researcher and it is considered the second densely populated governorate in Jordan. It also included areas that represent urban and rural population.

King Abdulla university hospital was founded in 2001, and is located in the campus of Jordan University of Science and Technology in the north of the Hashemite Kingdom of Jordan. It serves as a teaching hospital at Jordan University of Science and Technology, and as a referral hospital for all public sectors in the Northern Region. More than 85 percent of the hospital admissions are for patients referred by the JMOH and the royal medical services (111) with total bed capacity of 500 beds and (730) pediatric patient's monthly admission as stated by the medical record department.

Princess Rahmeh hospital is a pediatric- affiliated teaching hospital and outpatient clinics in Irbid that is located in the northern region of Jordan; this hospital is a part of JMOH, which is considered as the main public hospital that specialized in pediatrics in the northern region of Jordan. Total bed capacity is (113) beds and the number of pediatric patient's admission is nearly (570) per month.

Al-Ramtha governmental hospital is located in the northern region of Jordan. This hospital is part of JMOH public health sector. Total bed capacity is (93) beds and the number of pediatric patient's admission nearly (485) per month.

3.4 Population and Sampling Procedure

3.4.1 Target Population

The target population was all children diagnosed with symptoms of DD by pediatrician in both genders and younger than two years old.

3.4.2 Accessible Population

Accessible Population: all children diagnosed with symptoms of DD by pediatrician in both genders and younger than two years hospitalized at the time of data collection in pediatric floors in the selected hospitals, outpatient children who were attended to their pediatric out patient's clinics and affiliated health care centers of JMOH.

3.4.3 Sampling Technique

Non-probability convenience sampling technique was used. Before the sampling started, a randomization plan was developed using the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) software to assign the patient randomly on the treatment regimens. For this purpose, we entered numbers according to the computed sample size in the datasheet of the software that represented a sample subject. Then, using the "Select cases" option in the "Data" we chose "Random sample of cases" then from "sample" wrote "50" percent of all cases in option of "approximately" then we chose "continue". After that, treatment was randomly assigned into the two treatment groups and coded as "A" for Argan Spinosa Oil and "B" for topical hydrocortisone 1% ointment, and each group was representative of one group with computed sample numbers.

3.4.4 Sample

Children were selected from the three hospitals with their pediatric outpatient clinics and who attended the affiliated health care centers of JMOH included in this study. The sample size was calculated as below:

Based on Cohen sample size (1994), depending on analysis of f test, the required sample size at power of 0.80 and α of 0.05 with medium sample size (odd ratio = 1.72) . So, the total sample size that is required would be about 134 participants for both study groups. Attrition is estimated

to be approximately 20% of the total calculated sample size. Therefore, the final estimation of sample size is 160 participants.

Inclusion criteria was infants/toddlers who younger than two years or younger in both sexes and diagnosed with DD by a pediatrician at baseline day and are available in the selected hospitals, their clinics and affiliated health care centers of JMOH from February 2018 and May 2018 was recruited to participate in this study. Exclusion criteria included infants/toddlers who are with known physical history of co-morbidities disorders that require special treatment (kidney disorders, malignance, oral or genital thrush, psoriasis, on high protein diets or minerals deficiencies such as zinc deficiency); use of oral antibiotics therapy or topical non-steroidal anti-inflammatory drugs, participated in other study; and child with known allergic history to the active ingredients of trial medications.

3.5 Instruments

A visual analog scale was used in each assessment of DD area for seven consecutive days of the trial for each group. This scale has been adopted in several countries (105, 106). This grading scale is used to reflect the severity level of the diaper skin breakdown and dermatitis according to Davis et al. 1986. Respectively, grade-0 represents healthy, normal skin, no rash or erythema; grade-1 represents slight erythema of the entire diaper area or in patchy, localized areas; mild irritation or rash; grade-2 for definite erythema of the diaper area totally or in localized areas, with erythematous papules; moderate irritation or rash; grade-3 for moderate to severe erythema, with or without oozing, in a generalized pattern and associated with papules, pustules, or superficial ulceration; and extreme irritation or rash; grade-4 in cases of severe erythema involving the entire diaper area associated with oozing papules, pustules, and erosion (59) (Appendix A).

The effect of the treatment was assessed in scheduled home assessment visits using visual analog scale by blinded trained researcher in the baseline, first, third and seventh day of the trial and if any side-effects occur in each group. The schedule of improvement was classified as follows respectively: Allergic symptoms (yes/no); Onset of recovery in the first 12 hours of use (yes, no); improvement in the recovery through the first, third and seventh day (yes/no); day of disappearing symptoms; and no improvement within the trial period (yes, no). Parents were asked to keep pictures of their children's DD progress. The treatment was discontinued after two days in cases of rash score become zero (Appendix B).

A structured checklist was developed by the researcher based on the literature. The checklist collected information on 27 variables that are potential, or suspected, to be associated risk factors with diaper dermatitis. These factors include: the characteristics of the infants (age, gender, and weight), and mother or caregiver (age, parity, education level, job, income, nationality and home setting (rural, semi-urban and urban)), type of feedings, introduction of solid foods, general state of health of the child, recent antibiotic used before the episode, type of diaper, the number of changing diaper per a day, type of wipes, skin cleansing agents, barrier cream used, frequency of bathing, bowel frequency, history of diaper dermatitis (severity level, medication used in the previous episodes, duration of episode and frequency of diaper dermatitis per month) (Appendix C).

3.6 Data Collection Procedure

The data were collected for five days in each week during the three months of the data collection period, in each data collection day the researcher collected the data for 6 hours. Approval for the study was taken from the institutional review board (IRB) at Jordan University of Science and Technology and JMOH (Appendix D, E). The faculty of nursing at Jordan University of

Science and Technology sent a formal letter to the relevant health directorate describing the goal, objective, and nature of the study and requested a permission to start data collection. The selected hospitals, their outpatient clinics and affiliated health care centers of JMOH were visited and clear explanations about the study were provided for their directorate and also for children's families via phone numbers. During the data collection period; once the parents approved to voluntarily include their children in the study; they signed informed consent form (Appendix F) and were reassured that they are free to withdraw from the study at any time. The name and telephone number of researcher were given to the parents so that they could obtain any information regarding to the study at any time. Ultimately, one hundred and sixty (160) participants were recruited in the study and (160) checklists were filled by the researcher via a structured interview with an overall response rate of 87.5%.

3.7 Treatment Approach

3.7.1 Initial and Follow up Visits

The pediatrician did the initial consultation and evaluation in a private room that assured child information privacy at the baseline day in order to determine the DD severity level using the 5-point grading scale, after that he/she prescribed the treatment with sequentially numbered, sealed, and randomized envelope. The pediatrician was not informed about the bottles code; and then the researcher conducted a face-to-face interview in a private room with parents of children whom included in the study. The interviews were guided by a structured checklist were developed based on literature by the researcher. The checklist collected information regarding 27 variables that are potential, or suspected, to be associated risk factors with DD.

The researcher talked to children's caregivers, explained the study process and provided general consistent tips to the all of them, including firstly washing the affected area only with warm water, disposing the area to the fresh air and keep the area dry; secondly spreading the prescribed trial medications on the affected area sparingly over the lesions borders forth times per day, then diaper the baby; finally not to apply any on the affected area such as wet wipes, essence contained soaps, barrier cream or other medications during the seventh day of the trail. The home follow-up visits took place and the researcher re-evaluated diaper area using the 5-point grading scale in the first, third and seventh day of trail.

3.7.2 Treatment Intervention

Organic Argan Spinosa Oil was available in different specialist stores in Northern Jordan, the samples were produced in Pakistan, according to the certificate information of the product, the content is organic Argan Spinosa Oil and it was extracted in August 2017 from the hard core of the fruit by a traditional hand cold-press method. The composition of the oil as shown on the bottle label was: Campestrol (0.2%), Avenasterol (4.1%), Beta tocopherol (.1%), Gama tocopherol (86.5%), Delta tocopherol (7.0%), Alpha tocopherol (5.5%), Spinasterol (44.4%) and Tocopherol Totaux (738 mg/kg). The oil samples were carefully handled to avoid contamination and correctly stored and maintained in brown glass sealed bottles.

Topical hydrocortisone 1% ointment was purchased from different pharmacies in Northern Jordan, the samples were produced in Jordan by Hayat Pharmaceutical Industries, according to the certificate information of the product, the content is Econazole Nitrate 1% and Triamcinolone Acetonide 0.1% and it was produced in March 2017.

All medications were randomly coded by the researcher as "A" for Argan Spinosa Oil and "B" for topical hydrocortisone 1% ointment, then provided to the assessed Pediatrician (who was

not aware of the bottles cod) with sequentially numbered, sealed, and randomized. Children's Care givers were instructed to apply sparingly to the affected areas forth times per the day for both groups for planed seven consecutive days. The volume of medications was varied depending on the child weight and age.

3.8 Pilot Study

Before conducting the trial, a pilot study was conducted to assess the internal consistency of instruments. Furthermore, feasibility of data collection procedure was assessed in the pilot study including the length to complete the checklist and deciding whether it is reasonable or not. Also, the pilot study was conducted to identify practical limitations of instruments and to assess the understanding of items "readability" by target group and to identify ambiguities and difficult questions or words/terms.

The pilot study was carried out in February 2018 and children and were included in the main study. Using a convenience sample of 20 children's a companied with their caregivers are recruited from selected hospitals with their affiliated outpatient clinics and health care centers of JMOH; they were selected based on inclusion criteria for the study. Noteworthy, that the researcher used simple words in a tool to help the children's caregivers understand the questions without any difficulties.

The minimum time required to end the interview and fill out all items was ten minutes. Whereas, the maximum time required was fifteen minutes. Almost all children's caregivers in the pilot study have reported that the items were clear, understandable and feasible. So, no modification was done on the data collection procedure or instruments.

3.9 Extraneous Variables Management

We are aware about the possible effects of extraneous variables such as lack of cooperation, lack of consent patients for study participation, lack of nurse or mother compliance in the application of the treatment, cross contaminations caused by poor hygiene or apply any additional products in the tested areas which effect on the study results. However, we have a control group; we chose a randomized assigned treatment for both groups, daily contact telephone and schedule reassessment visits to the participating children's caregiver; no data collected at the same time from both study groups and we asked them to keep the empty medication bottle and we used a statistical control tests.

3.10 Ethical Considerations

Prior to conducting the research study, the researcher was sought approval from Jordan university of science and technology IRB, as well as the permission of the JMOH and administrator of each of the three selected hospitals with their affiliated outpatient clinics and health care centers. The consent form the children's caregiver was signed and include details about the purpose of the study, data collection procedure, ttreatments intervention, time required to complete the trial, home schedule visits as well as the risk and benefits of participating in the study. In addition the consent was included a clear statement that the children's caregiver is completely voluntary and the children's caregiver has the right to reconsider their child participation and withdraw at any time of the study without any consequences. No payments were given to children's caregiver during their participation.

Any further questions during the trail were answered and explained by the researcher and contact phone number and details for the researcher were made available on their copy of informed consent. Results of the study were made available among their request.

Furthermore, children's' privacy was protected by ensuring that all consultations took place in private consultation pediatrician rooms. No names or any information that could link the children with their data specifically that were used in the research dissertation. Also, children were allocated as number by the researcher. The data was not be shared with anybody, only the researcher and the research advisors accessed it. Children's caregiver approval for photo was taken for study purpose. All children's' photo were kept on secured CD in the research advisor's office and deleted from the researcher phone.

Sensitivity test were conducting before child participation for both groups for a possible allergic reaction on the infant's arm; children were referred to their relevant pediatrician if cases where symptoms of DD did not resolve or a possible allergy was suspected. No side effects were observed and well tolerated in both study groups.

3.11 Statistical Analysis

The collected data was analyzed using Statistical Package for Social Sciences (SPSS) version 25. **Descriptive statistics** (proportions, percentage, median, interquartile range (IQR), Mean) were used to describe group of measurements as well as progress over time and have shown in tables and figures. **Pearson's Chi-Square test or its exact counterpart (Fisher exact test) for not normally distributed categorical variables, and Mann–Whitney U test for not normally distributed continuous variables** were used to assess the associations and differences between variables in both groups as well as to determine both groups homogeneity at the baseline day**.** Significance was tested at alpha level < 0.05.

Ordinal logistic regression analysis using **Generalized Estimating Equations (GEE)** models was used to describe the changes over time rather than absolute values at different time

points in both study group during the trail. Generalized Estimating Equations model allows analysis to determine the progress and variability within participants over the first, third, and seventh treatment day of the and show a change of measurements in each group (107, 108).

Initially, **Univariate logistic regression** analysis was performed to predict associated factors with DD by calculating the odds ratios (OR) and 95% confidence intervals (CI). Independent association of the retained variables significant at $p < 0.05$ were then entered into the **multivariate logistic regression analysis** (a backward elimination model) to identify the final significant predictors and risk factors as significant in accordance when $P < 0.05$, while simultaneously controlling for potential confounders.