

IMPACT OF COCK UP SPLINTS TO CHILDREN WITH WRIST DROP IN MULAGO ORTHOPAEDIC WORKSHOP. A CROSS-SECTIONAL STUDY.

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Abstract

Background

The management of wrist drops involves the use of a wrist splint commonly known as a cock-up splint and physical therapy. The study aims to assess the Impact of cock-up splints on children with wrist drops in the MNRH Orthopedic Workshop.

Methodology

A cross-sectional study using quantitative data collection methods to collect data from 45 Respondents who were wrist drop patients between 10 to 18 years old.

Results

A significant impact of cock-up splints in the management of wrist drops was reported. The majority of the respondents 18(40%) had improved wrist alignment, 10(26.7%) had improved range of motion at the wrist joint, 9(20%) improved muscle power, and 6(13%) experienced a reduction in pain. negative impacts of cock-up splints on wrist drop patients. Majority of the patients 36(80%) had discomfort while 9(20%) didn't experience it, 26(57.8%) got muscle weakness and atrophy unlike the 19(42.2%), 34(75.6%) had limited range of motion at the wrist joint while 11(24.4%). As 27(60%) had skin irritations while 18(40%) did not get any skin irritations. 27(60%) were males while 18(40%) were females.

Conclusion

Cock up splints had a recommendable positive impact on wrist drop patients where they helped in relieving patients of pain and improved the prognosis of the patients despite other notable side effects associated with their use like skin irritation and discomfort.

Recommendation

Efforts should be made by Orthopedic Technologists to address the negative effects of cock-up splints on patients such as discomfort, muscle weakness, and atrophy. Limitation of range of motion and skin irritations through making better cock up designs with inner soft liners or paddings as these will allow comfortability and also avoid direct contact of device material plastic or metal with the skin thus avoiding skin irritations.

Keywords: Impact of cock-up splints, Children with wrist drop, and Orthopedic Technologists.

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Background of the study

The management of wrist drops involves the use of a wrist splint commonly known as a cock-up splint and physical therapy. However, if there is a mechanical cause such as bone spur or compression then surgery may be helpful. Approximately 70% of radial nerve palsy cases have been reported to be resolved with conservative treatment using a cock-up splint (Harris et al, 2016). A survey of children below 18.0 years in West Kiang of Gambia demonstrated a prevalence of rickets-like bone deformity-like wrist drop at 3.3% based on physical signs by trained survey staff, and 0.6% after medical examination by a clinician (Jones et al, 2009).

Splints have been found to greatly improve hand dexterity in patients with radial nerve palsy who have wrist drops compared with no splint (Arnold et al, 2012). A wrist splint that incorporates the MCP joints is more effective than the traditional wrist-only splint, with long-lasting improvements that remained consistent

after 6 months of the splint intervention (Nadar, 2023). Cock up splints contact more of the skin exposing the wearer to discomfort from heat retention and possible chafing tending to bring about awkward cosmetic issues and confound the likelihood of patients accepting the splint besides bulk to the limb. The use of cock-up splints in the management of wrist drops remains a topic of debate in the literature while some studies have reported significant improvements in hand dexterity, pain, and physical function others have shown negative impacts of cock up splints on patients with wrist drop like muscle fatigue, discomfort, skin irritations. The study aims to assess the Impact of cock-up splints on children with wrist drops in the MNRH Orthopedic Workshop.

Methodology Study Design

A Cross-sectional design with quantitative data collection methods. The quantitative study design was

selected because of its flexibility in collecting data for the study in the shortest time possible.

Study Setting

The study was conducted at an Orthopedic workshop in the MNRH Kampala district. The hospital serves a large population of the entire country of Uganda. The study setting was selected because it is one of the biggest orthopedic referral health facilities in Uganda with a total of 40 orthopedic health workers.

Study Population

The study included all those male and female patients having wrist drops that were present at the Mulago orthopedic workshop this population was used because of the increasing cases of wrist drops at the orthopedic workshop and only those who were willing to get involved in the study.

Sample Size Determination.

The sample size will be computed using Slovin's formula.

Expressed as $n = \frac{N}{1 + Ne^2}$

Where n = minimum sample size desired

N = Study population

e = level of significance which is 0.05

$n = \frac{45}{1 + 45 \times 0.05 \times 0.05}$

n=45

The sample size of the study was 45 respondents.

Sampling Technique

A non-probability convenient sampling technique was used to select respondents that were available at the time of data collection at the orthopedic workshop; MNRH.

The respondents were sampled on a first come first serve basis.

Sampling Procedure

A simple random sampling technique was employed where every wrist drop among patients of 10 to 18 years had an equal opportunity of being selected for the study.

Data Collection Method

Data was collected using self-administered questionnaires.

Data Collection Tools

The tools that were used include; pencils, pens, rubbers, notebooks, and self-administered questionnaires.

Data Collection Procedure

A research assistant was trained on data collection specifically reading questions to the respondents. The principal researcher and the research

assistant explained the purpose of the study to the respondents who filled out a consent form before they were given the questionnaires. The researcher assured the respondents about privacy and confidentiality by informing them not to include their names on the questionnaire. After finishing the questionnaires, the researcher collected them and crosschecked them for completeness and correctness before he left the study area.

Study Variables

Independent Variables

The independent variable for the study was the presumed cause of the dependent variable and it was the use of cock-up splint among patients aged 10 to 18 years.

Dependent Variables

The dependent variables were the presumed effects of the independent variable; the impact of cock-up splints on wrist drop patients to cock up splints use.

Quality Control

Reliability and Validity of Research Instruments.

The researcher pretested the questionnaires among patients with wrist drops at CoRSU hospital before the actual data was collected because the facility had similar settings and could handle cases like the Mulago orthopedic workshop. Data was analyzed and adjusted accordingly, and questionnaires were checked for data accuracy, consistency, adequacy, quality completeness, and any identified mistakes were corrected.

Data Analysis and Presentation

Data from filled questionnaires was sorted, recorded, categorized, coded, and summarized. The results were edited for errors. The data was analyzed manually for accuracy, consistency, and completeness by the principal researcher. Quantitative data was presented in tables, graphs, and pie charts and this helped to illustrate the statistical significance of data.

Ethical Considerations

An introductory letter seeking permission to carry out research was delivered to the MNRH Research and Ethics Committee. The purpose of the study was explained to the respondents and consent was obtained before giving out questionnaires and interview schedules. Each respondent was assured of privacy and confidentiality since no names were written on the interview schedule and questionnaire. Sensitive issues were explored before a good relationship was established with the respondents.

Results

Table 1: Social demographic factors of respondents.

Variable	Category	Frequency(N)	Percentage(%)
AGE	10 to 13 years	27	60
	13 to 16 years	9	20
	16 to 18 years	9	20
GENDER	Male	27	60
	Female	18	40
OCCUPATION	Civil servant	6	13.3
	Business person	12	26.7
	Unemployed	27	60
RELIGION	Catholic	13	28.9
	Moslem	14	31.1
	Protestant	18	40
CADRE	Primary	6	13.3
	Secondary	12	26.7
	Tertiary	9	20
	None	18	40

As seen in Table 1, 27(60%) were males while 18(40%) were females out of the 45 respondents. Most of the respondents 27(60%) were aged 10 to 13 years, 9(20%) were 13 to 16 years while 9(20%) were 16 to 18 years. Majority of the respondents 27(60%) were unemployed,

6(13.3%) were civil servants and 12(26.7%) were doing business. Most of the patients 18(40%) were protestants. Most of the patients 18(40%) were illiterate and not educated, 6(13.3%) attended primary, 12(26.7%) attended secondary while 9(20%) attended tertiary institution.

**Impact of cock-up splints in management of wrist drop.
 Figure 1: Shows the significant impact of cock-up splints.**

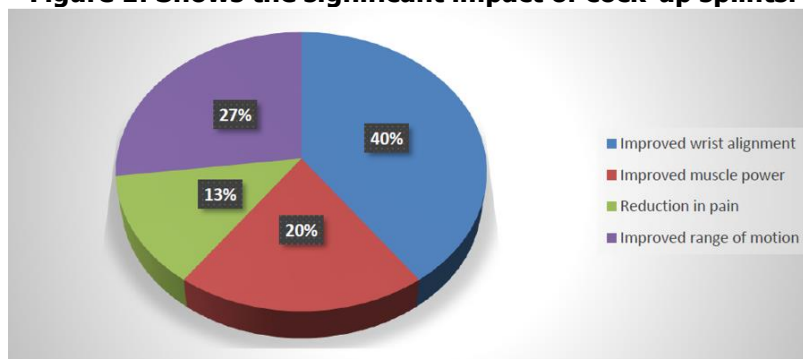


Figure 1 shows the significant impact of cock-up splints in the management of wrist drops and the majority of the respondents 18(40%) had improved wrist alignment,

10(26.7%) had improved range of motion at the wrist joint, 9(20%) improved muscle power and 6(13%) experienced reduction in pain.

Figure 2: Shows the negative impact of cock-up splints on patients in wrist drop management.

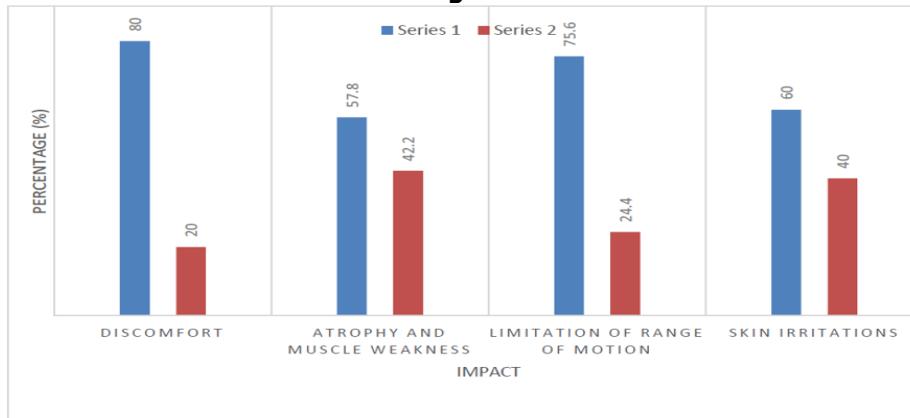


Figure 2 shows the negative impacts of cock up splints on wrist drop patients. Majority of the patients 36(80%) had discomfort while 9(20%) didn't experience it, 26(57.8%) got muscle weakness and atrophy unlike the 19(42.2%), 34(75.6%) had limited range of motion at the wrist joint while 11(24.4%). As 27(60%) had skin irritations while 18(40%) did not get any skin irritations.

Discussion

The study results revealed that cock up splints have significant positive effects on various parameters related to wrist drop of cock-up splints to patients with wrist drop such as wrist alignment, muscle power, and pain reduction. Specifically, the majority of the respondents (40%) reported improvement in wrist alignment (26.7%), muscle power (20%), and pain (13%) these improved results are due to a good design of the cock up splints and adherence that enabled the restoration of the neuromusculoskeletal system of this study were similar to those obtained by Garg Who found out that Significant pain relief with the wrist extension splint may be due to improved immobilization of the wrist extensor muscles in a resting position (Garg et al, 2010). The study highlighted the negative impact of cock-up splints on patients with wrist drops. That is the majority of the patients (80%) reported discomfort while wearing cock up splints which is a significant concern as it could affect their treatment adherence, this could be due to rubbing of the cock-up splint on the patients' skin, increased peak pressure on the lateral aspect of the wrist joint and psychological tension mostly among adolescents. A considerable proportion of the patients experienced muscle weakness and atrophy (57%) this indicates that it can also affect adherence to cockup splints in the management of wrist drops. The muscle atrophy and weakness could be due to decreased muscle activity mostly when using solid cock-up splints that lock the joint limiting movement. This is similar to the results of the study carried out by Excessive, continuous use of a brace or splint can lead to chronic pain

and stiffness of a joint or muscle weakness (Gravlee et al, 2007). Skin irritation was also a negative effect due to wearing cock up splints to manage wrist drop as (60%) of the patients had experienced skin irritation, this indicates that it could be a significant factor affecting adherence, this was more likely to occur due to perspiration and body allergy reaction to paddings. These findings were similar to the results of a study carried out by Althoff AD who found out that the use of splints may cause excess pressure on the soft tissues and may decrease the blood flow to the skin surface, causing irritation and necrosis (Althoff AD 2023). The study results revealed that cock up splints have significant positive effects on various parameters related to wrist drop of cock-up splints to patients with wrist drop such as wrist alignment, muscle power, and pain reduction. Specifically, the majority of the respondents (40%) reported improvement in wrist alignment (26.7%), muscle power (20%), and pain (13%) these improved results are due to a good design of the cock-up splints and adherence that enabled restoration of the neuromusculoskeletal system. These findings indicate that cock up splints could be an effective option in the treatment of wrist drop. This study highlighted the negative impact of cock-up splints on patients with wrist drops. That is the majority of the patients (80%) reported discomfort while wearing cock up splints which is a significant concern as it could affect their treatment adherence, this could be due to rubbing of the cock-up splint on the patients' skin, increased peak pressure on the lateral aspect of the wrist joint and psychological tension mostly among adolescents.

Additionally, a considerable proportion of the patients experienced muscle weakness and atrophy (57%) this indicates that it can also affect adherence to cockup splints in the management of wrist drops. The muscle atrophy and weakness could be due to decreased muscle activity mostly when using solid cock-up splints that lock the joint limiting movement.

Skin irritation was also a negative effect due to wearing cock-up splints to manage wrist drop as (60%) of the patients had experienced skin irritation, this indicates that it could be a significant factor affecting adherence, this was more likely to occur due to perspiration and body allergy reaction to paddings.

Conclusion

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Recommendation

Efforts should be made by Orthopedic Technologists to address the negative effects of cock-up splints on patients such as discomfort, muscle weakness, and atrophy. Limitation of range of motion and skin irritations through making better cock up designs with inner soft liners or paddings as these will allow comfortability and also avoid direct contact of device material plastic or metal with the skin thus avoiding skin irritations.

Study Limitations

Scarcity of funds to enable the researcher to complete the research in time. Time was also thought to be another limiting factor.

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List of Abbreviations

MCP: Metacarpophalangeal

MNRH: Mulago National Referral Hospital

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Conflict of interest

No conflict of Interest.

Author Biography

Ernest Bisanga Obonyo is a diploma student at the Orthopaedic Technology Training School -Uganda Institute of Allied Health and Management Science -Mulago.

References

1. Althoff AD, Reeves RA. Splinting. [Updated 2023 Aug 6]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK557673/>
2. Arnold WD, Krishna VR, Feimer M, Kissel JT, Elsheikh B. (2012). Prognosis of acute comprehensive acute radial neuropathy.45;893-895
3. Garg, Rishi & Adamson, Gregory & Dawson, Patrick & Shankwiler, James & Pink, Marilyn. (2010). A prospective randomized study comparing a forearm strap brace versus a wrist splint for the
4. Gravlee, J. R., & Van Durme, D. J. (2007). Braces and splints for musculoskeletal conditions. *American Family Physician*, 75(3), 342–348.
5. treatment of lateral epicondylitis. *Journal of shoulder and elbow surgery / American Shoulder and Elbow Surgeons ... [et al.]*. 19. 508-12. 10.1016/j.jse.2009.12.015.
6. Harris AP, Gil JA, Defroda SF, Waryasz GR et al (2016); Modified coaptation splint with sugar tong intrinsic plus extension for initial alignment of wrist drop. *AM J Emerg Med*. 2016 Mar;34(3):659-663.
7. Jones, Helen & Jammeh, Lamin & Ebrim, A. & Bikwe, M. & Owens, Stephen & Fulford, Tony & Pettifor, John & Prentice, Ann. (2009). Prevalence of rickets-like bone deformities in rural Gambian children. *Bone*. 45. 10.1016/j.bone.2009.04.114.
8. Nadar, M. S., Alotaibi, N., & Manee, F. (2023). Efficacy of splinting the wrist and metacarpophalangeal joints for the treatment of Carpal tunnel syndrome: an assessor-blinded randomized controlled trial. *BMJ open*, 13(11), e076961. <https://doi.org/10.1136/bmjopen-2023-076961>

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